

SKINNER LANDFILL WORK GROUP

February 28, 2001

Mr. Scott K. Hansen
Remedial Project Manager
USEPA - Region 5
77 West Jackson Boulevard
Chicago, IL 60804-3590

EPA Region 5 Records Ctr.



230261

Re: **Final Skinner Health and Safety Plan**

Dear Mr. Hansen:

Enclosed please find the final version of the Health and Safety Plan for the Skinner Landfill site. The enclosed Health and Safety Plan incorporates comments to Township Comments detailed in your January 11, 2001 letter.

I trust that these final changes will enable approval of the plan for use in the field. Please contact me at (517) 636-0787 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Ben Baker/EE".

Ben Baker
Skinner Landfill Work Group
Technical Coordinator

cc: Om Patel, Roy F. Weston
Ronald F. Roelker, Earth Tech

MASTER HEALTH AND SAFETY PLAN

CONSTRUCTION PHASE SKINNER LANDFILL SITE BUTLER COUNTY WEST CHESTER, OHIO

Prepared for:

Skinner Landfill Group
c/o Ben Baker
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Midland, MI 48764

Prepared by:

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FINAL

Project Number 38335

MASTER HEALTH AND SAFETY PLAN

CONSTRUCTION PHASE
SKINNER LANDFILL SITE
BUTLER COUNTY
WEST CHESTER, OHIO

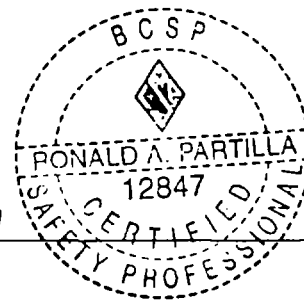
Project Number: 38335

Prepared by:




Ronald A. Partilla, CSP, OHST
Health and Safety Professional

2-27-01
Date

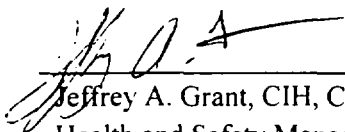


Reviewed by:



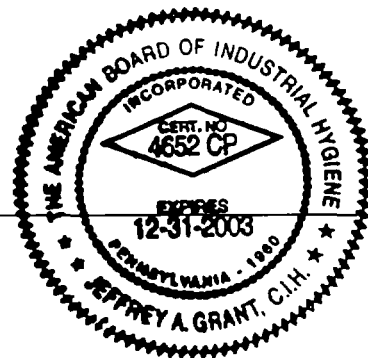
Rick A. Warwick
Project Manager

2/27/01
Date



Jeffrey A. Grant, CIH, CSP
Health and Safety Manager

2-27-01
Date



DISCLAIMER

This Health and Safety Plan (HASP) was prepared to be used by employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. It is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project. However, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury. If site conditions are discovered which are not covered in this document, on site personnel should notify an Earth Tech Health and Safety Representative to develop an addendum to this document.

RECORD OF AMENDMENTS

[illegible]

LIST OF ACRONYMS

| | |
|-------------------------|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| ANSI | American National Standards Institute |
| Btu/lb | British thermal unit per pound |
| BWL | Body water loss |
| °C | Degrees Celsius |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CIH | Certified Industrial Hygienist |
| CNS | Central nervous system |
| CPM | Construction Project Manager |
| CPR | Cardiopulmonary resuscitation |
| CRZ | Contamination Reduction Zone |
| CSP | Certified Safety Professional |
| eV | Electron Volts |
| °F | Degrees Fahrenheit |
| EZ | Exclusion Zone |
| HASP | Health and Safety Plan |
| HAZCOM | Hazard Communication |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| HMIS | Hazardous Materials Information System |
| HR | Heart rate |
| HSM | Health and Safety Manager |
| IARC | International Agency for Research on Cancer |
| LEL | Lower explosive limit |
| mg/m³ | Milligrams per cubic meter |
| mg/kg | Milligrams per kilogram |
| mg/L | Milligrams per liter |
| MSDS | Material Safety Data Sheet |
| NIOSH | National Institute for Occupational Safety and Health |
| NA | Not Applicable |
| NK | Not Known |
| NPL | National Priorities List |
| OHST | Occupational Health and Safety Technologist |
| OSHA | Occupational Safety and Health Administration |
| OT | Oral temperature |
| OUPS | Ohio Utility Protection Service |
| PCB | Polychlorinated biphenyl |
| PEL | Permissible Exposure Limit |
| PPE | Personal protective equipment |
| PPM | Parts per million |

| | |
|----------------------|---|
| PVC | Polyvinyl chloride |
| RCRA | Resource, Conservation and Recovery Act |
| R_x | Optical correction |
| SARA | Superfund Amendments and Reauthorization Act |
| SCBA | Self-Contained Breathing Apparatus |
| SLG | Skinner Landfill Group |
| SOP | Standard Operating Procedure |
| SSO | Site Safety Officer |
| STEL | Short Term Exposure Limit |
| SZ | Support Zone |
| µg/L | Micrograms per Liter |
| UEL | Upper explosive limit |
| U.S. EPA | United States Environmental Protection Agency |
| VOC | Volatile organic compound |

TABLE OF CONTENTS

| | |
|---|------------|
| DISCLAIMER | |
| RECORD OF AMENDMENTS | |
| LIST OF ACRONYMS | |
| RECORD OF AMENDMENTS | 4 |
| 1.0 INTRODUCTION | 1-1 |
| 1.1 GENERAL..... | 1-1 |
| 1.2 POLICY STATEMENT | 1-1 |
| 1.3 SITE INFORMATION..... | 1-1 |
| 1.3.1 Description..... | 1-1 |
| 1.3.2 Background/History..... | 1-2 |
| 1.4 REFERENCES..... | 1-3 |
| Figure 1 Skinner Landfill Site Location Map..... | 1-4 |
| 2.0 SCOPE OF WORK | 2-1 |
| 2.1 GENERAL..... | 2-1 |
| 3.0 PROJECT HEALTH AND SAFETY ORGANIZATION | 3-1 |
| 3.1 ORGANIZATIONAL STRUCTURES..... | 3-1 |
| 3.2 ALL PERSONNEL..... | 3-1 |
| 3.3 PROJECT MANAGEMENT..... | 3-1 |
| 3.3.1 Construction Project Management Responsibilities..... | 3-2 |
| 3.3.2 Construction Project Management Authority..... | 3-2 |
| 3.4 HEALTH AND SAFETY MANAGER..... | 3-2 |
| 3.4.1 Health and Safety Manager Responsibilities..... | 3-2 |
| 3.4.2 Health and Safety Manager Authority..... | 3-3 |
| 3.5 SITE HEALTH AND SAFETY OFFICER..... | 3-3 |
| 3.5.1 Responsibilities..... | 3-3 |
| 3.5.2 Site Safety Officer Authority..... | 3-4 |
| 3.6 EMPLOYEES..... | 3-5 |
| 3.6.1 Employee Responsibilities..... | 3-5 |
| 3.6.2 Employee Authority..... | 3-5 |
| 3.7 SUBCONTRACTORS | 3-6 |
| 3.7.1 Subcontractor Responsibilities..... | 3-6 |
| 3.7.2 Subcontractor Authority..... | 3-6 |
| 3.8 VISITORS | 3-6 |
| 4.0 HEALTH AND SAFETY PROGRAMS..... | 4-1 |
| 4.1 MEDICAL MONITORING AND SUPPORT PROGRAM..... | 4-1 |
| 4.1.1 Physical Examinations..... | 4-1 |
| 4.1.2 Subcontractor Personnel | 4-1 |
| 4.1.3 Medical Assistance..... | 4-2 |
| 4.1.4 First Aid..... | 4-2 |
| 4.2 ACCIDENT INVESTIGATION AND PREVENTION PROGRAM..... | 4-2 |
| 4.2.1 Accident/Injury Reporting..... | 4-2 |
| 4.2.2 Client Notifications..... | 4-3 |
| 4.2.3 Accident Prevention Procedures..... | 4-3 |

| | | |
|--|---|------|
| 4.3 | HEALTH AND SAFETY TRAINING PROGRAMS..... | 4-3 |
| 4.3.1 | General Health and Safety Training..... | 4-3 |
| 4.3.2 | Site-Specific Training..... | 4-4 |
| 4.3.3 | HAZWOPER Training Exceptions..... | 4-4 |
| 4.3.4 | Hazard Communication..... | 4-5 |
| 4.4 | PERSONAL SAMPLING..... | 4-5 |
| 4.5 | ENVIRONMENTAL SAMPLING..... | 4-5 |
| 4.6 | CALIBRATION MONITORING EQUIPMENT..... | 4-6 |
| 4.7 | STOP WORK AUTHORITY..... | 4-6 |
| 5.0 | HAZARD ASSESSMENT..... | 5-1 |
| 5.1 | SITE DESCRIPTION..... | 5-1 |
| 5.2 | GENERAL HAZARDS..... | 5-1 |
| 5.2.1 | Chemical Exposures..... | 5-1 |
| 5.2.1.1 | Exposure Information..... | 5-2 |
| Table 2: Exposure Limits..... | | 5-2 |
| 5.2.1.2 | Additional HAZCOM Information..... | 5-3 |
| 5.2.1.3 | Physical Information..... | 5-5 |
| 5.2.1.4 | Symptom/First Aid Information..... | 5-6 |
| 5.2.2 | Heat Stress..... | 5-6 |
| 5.2.2.1 | Heat Stress Monitoring..... | 5-6 |
| OBSERVATION CONCENTRATING ON HEAT STRESS SYMPTOMS..... | | 5-6 |
| 5.2.2.2 | Prevention of Heat Stress..... | 5-7 |
| 5.2.3 | Cold Stress..... | 5-7 |
| 5.2.3.1 | Cold Stress Effects..... | 5-7 |
| 5.2.3.2 | Exposure Limits and Cold Stress Monitoring..... | 5-8 |
| 5.2.3.3 | Control Measures..... | 5-8 |
| 5.2.4 | Hazardous Noise..... | 5-9 |
| 5.2.4.1 | Noise Exposure Monitoring..... | 5-9 |
| 5.2.5 | Excavation and Trenching..... | 5-10 |
| 5.2.5.1 | Excavation Construction Guidelines..... | 5-10 |
| 5.2.5.2 | Trench Entry Requirements..... | 5-11 |
| 5.2.6 | Confined Space Entry..... | 5-11 |
| 5.2.7 | Electrical Safety..... | 5-15 |
| 5.2.7.1 | Instructions..... | 5-15 |
| 5.2.7.2 | Treatment in Case of Injury..... | 5-15 |
| 5.2.8 | Equipment Lockout/Tagout..... | 5-16 |
| 5.2.8.1 | Instructions..... | 5-16 |
| 5.2.8.2 | Restoring Equipment to Service..... | 5-16 |
| 5.2.8.3 | Procedure Involving More Than One Person..... | 5-17 |
| 5.2.9 | Vehicle Safety..... | 5-17 |
| 5.2.9.1 | Standard Operating Procedures..... | 5-17 |
| 5.2.9.2 | Vehicle Safety..... | 5-17 |
| 5.2.9.3 | Safety Devices..... | 5-18 |
| 5.2.9.4 | Transport of Cargo..... | 5-18 |
| 5.2.9.5 | Motor Vehicle Incident Reporting and Investigation..... | 5-18 |
| 5.2.10 | Slips, Trips, Falls, and Protruding Objects..... | 5-18 |
| 5.2.11 | Elevated Work Areas..... | 5-18 |
| 5.2.12 | Cranes, Derricks, and Hoists..... | 5-19 |
| 5.2.13 | Underground Construction and Utilities..... | 5-19 |
| 5.2.14 | Manual Lifting..... | 5-20 |
| 5.2.15 | Hot Work..... | 5-20 |
| 5.2.15.1 | Welding/Cutting Operations..... | 5-20 |
| 5.2.15.2 | Compressed Gas Safety For Welding/Cutting..... | 5-21 |

| | | |
|----------------------------------|---|------|
| 5.2.15.3 | Compressed Gas Cylinders..... | 5-21 |
| 5.2.15.4 | Pressure Regulators..... | 5-22 |
| 5.2.15.5 | Hot Work Permit..... | 5-23 |
| 5.2.16 | Site Clearing and Grubbing..... | 5-23 |
| 5.2.17 | Biological Hazards..... | 5-23 |
| 5.2.18 | Radiological Hazards..... | 5-24 |
| 5.2.18.1 | Direct Read Monitoring..... | 5-24 |
| 5.2.18.2 | Radiological Hazardous Waste..... | 5-24 |
| 5.2.19 | Ladders..... | 5-24 |
| 5.2.20 | Impacted Material Sampling and Removal..... | 5-26 |
| 5.2.21 | Waste Container Handling and Testing..... | 5-26 |
| 5.3 | GENERAL ENVIRONMENTAL CONTROLS..... | 5-27 |
| 5.3.1 | Illumination..... | 5-27 |
| 5.3.2 | Housekeeping..... | 5-27 |
| 5.3.3 | Water Supply..... | 5-27 |
| 5.3.4 | Toilet Facilities..... | 5-27 |
| 5.3.5 | Washing Facilities..... | 5-27 |
| 5.4 | COMMUNICATIONS..... | 5-28 |
| 5.5 | BUDDY SYSTEM..... | 28 |
| 6.0 | PERSONAL PROTECTIVE EQUIPMENT..... | 6-1 |
| 6.1 | HEAD PROTECTION..... | 6-1 |
| 6.2 | EYE PROTECTION..... | 6-2 |
| 6.3 | HEARING PROTECTION..... | 6-2 |
| 6.4 | FOOT PROTECTION..... | 6-2 |
| 6.5 | HAND PROTECTION..... | 6-3 |
| 6.6 | RESPIRATORY PROTECTION..... | 6-3 |
| 6.6.1 | Breathing Air Quality..... | 6-3 |
| 6.7 | BODY PROTECTION..... | 6-3 |
| 6.8 | HEALTH AND SAFETY ACTION LEVELS..... | 6-4 |
| 7.0 | EMERGENCY RESPONSE PLAN..... | 7-1 |
| 7.1 | INTRODUCTION..... | 7-1 |
| 7.2 | WHAT IS AN EMERGENCY?..... | 7-1 |
| 7.3 | IMPLEMENTATION OF EMERGENCY PLAN..... | 7-1 |
| 7.4 | EMERGENCY COORDINATOR AND STAFF..... | 7-2 |
| 7.5 | EMERGENCY CONDITION/RESPONSE..... | 7-3 |
| 7.5.1 | Explosion..... | 7-3 |
| 7.5.2 | Hazardous Material Release..... | 7-4 |
| 7.5.2.1 | Material Release Response..... | 7-4 |
| 7.5.3 | Leaking Pipelines, Tanks, Vessels..... | 7-4 |
| 7.5.4 | Severe Weather..... | 7-5 |
| 7.5.5 | Fires..... | 7-6 |
| 7.5.6 | Power Interruptions..... | 7-7 |
| 7.6 | MEDICAL EMERGENCIES..... | 7-8 |
| 7.7 | SAFETY EQUIPMENT PROBLEMS..... | 7-8 |
| 7.8 | EMERGENCY/SAFETY EQUIPMENT..... | 7-8 |
| 7.8.1 | List of Equipment..... | 7-8 |
| 7.8.2 | First Aid Kits..... | 7-9 |
| 7.8.3 | Eyewash Units..... | 7-9 |
| 7.8.4 | Fire Extinguisher..... | 7-9 |
| Table: 9 Emergency Contacts..... | | 7-10 |

| | |
|--|-------------|
| Emergency Coordinators | 7-10 |
| Earth Tech Officials..... | 7-10 |
| Table: 9 Emergency Contacts (Continued) | 7-11 |
| Public Utilities Phone | 7-11 |
| Additional Contacts (if necessary, site personnel will be inserted below)..... | 7-11 |
| 8.0 SITE CONTROL | 8-1 |
| 9.0 DECONTAMINATION | 9-1 |
| 9.1 PERSONNEL DECONTAMINATION | 9-1 |
| 9.1.1 Personnel Decontamination Steps | 9-1 |
| 9.2 EQUIPMENT DECONTAMINATION | 9-3 |
| 9.3 DISPOSAL | 9-3 |
| 10.0 PERSONAL ACKNOWLEDGEMENT | 10-1 |

Figures

| | | |
|----------|--|------|
| Figure 1 | Skinner Landfill Site Location Map | 1-4 |
| Figure 2 | Project Health and Safety Organization | 3-1 |
| Figure 3 | Skinner Landfill to Mercy Hospital Route Map | 7-12 |
| Figure 4 | Mercy Hospital Route Map - Detail | 7-13 |

Tables

| | | |
|---------|--|------|
| Table 1 | Environmental Sampling | 4-6 |
| Table 2 | Exposure Limits | 5-2 |
| Table 3 | Physical Information | 5-5 |
| Table 4 | Maximum Daily Limits for Exposures at Low Temperatures | 5-9 |
| Table 5 | Allowable Noise Levels | 5-10 |
| Table 6 | Air Monitoring Action Levels | 6-5 |
| Table 7 | Operation-Specific PPE Guidelines | 6-6 |
| Table 8 | Hazard Analyses For PPE | 6-7 |
| Table 9 | Emergency Contact Numbers | 7-10 |

Appendices

| | |
|------------|---|
| Appendix A | Standard Operating Procedures Additional Health and Safety Forms Exposure Control Plan for Bloodborne Pathogens |
| Appendix B | HAZWOPER Certifications |
| Appendix C | Hazard Communication Program |
| Appendix D | Material Safety Data Sheets |
| Appendix E | Site-Specific Health and Safety Plan Supplements |
| Appendix F | Health and Safety Plan Acknowledgement Form |

1.0 INTRODUCTION

This Health and Safety Plan (HASP) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the Skinner Landfill site near West Chester, Butler County, Ohio (see Figure 1). Site-specific Health and Safety Supplements will be generated as necessary to address any additional unforeseen conditions associated with this project, and will require acknowledgment in writing on their respective signature pages. Once generated, each Supplement will be inserted as an appendix, documented on the HASP Record of Amendments, and reviewed by field personnel prior to the start of applicable work activities.

1.1 GENERAL

The provisions of this HASP are mandatory for all personnel engaged in field work associated with the environmental services being conducted at the Skinner Landfill site. A copy of this HASP and any applicable HASP Supplements shall be maintained on site and available for review at all times. Recordkeeping will be maintained in accordance with this HASP and Standard Operating Procedures (SOPs). See Appendix A for applicable SOPs. In the event of a conflict between this HASP and federal, state, and local regulations or the Health and Safety SOPs, workers shall follow the more stringent, more protective requirements.

1.2 POLICY STATEMENT

It is the site policy to provide a safe and healthy work environment for all employees. No phase of operations or administration is of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. Every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident.

This HASP and its appendices present procedures for the Skinner Landfill Project. The practices and procedures presented in this HASP and any supplemental documents associated with this plan are binding on employees while engaged in work. In addition, all site visitors shall abide by these procedures. Operational change to this plan and supplements that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the Construction Project Manager (CPM) and the Health and Safety Manager (HSM). This HASP is based on Federal and State safety and health regulations.

1.3 SITE INFORMATION

This section provides a general description and historical information associated with the Skinner Landfill site.

1.3.1 DESCRIPTION

The Skinner Landfill site is located approximately 15 miles north of Cincinnati, Ohio, near West Chester, Butler County, Ohio (see Figure 1 at the end of this section). The site is located along Cincinnati-Dayton Road as shown on Figure 1. The site is bordered on the south by the East Fork of Mill Creek, on the north by wooded land, on the east by a Consolidated Railroad Corporation (Conrail) railroad right-of-

way, and on the west by Skinner Creek.

Though the Skinner property is comprised of approximately 78 acres of hilly terrain, only a portion of the site is subject to remedial action. As per the Statement of Work, the remedial action area is generally limited to a fenced area established under the December 9, 1992, Unilateral Administrative Order (UAO) relating to the first operable unit for the site. Throughout this HASP the remedial action work will refer to this fenced portion of the site.

The site is located in a highly dissected area that slopes from a till-mantled bedrock upland to a broad, flat-bottomed valley that is occupied by the main branch of Mill Creek. Elevations on the site range from a high of nearly 800 feet above mean sea level (msl) in the northeast, to a low of 645 feet msl near the confluence of Skinner Creek and the East Fork of Mill Creek. Both of these streams flow to the southwest from the site toward the main branch of Mill Creek. A third on-site stream, Dump Creek, borders the landfill on the east. Dump Creek is intermittent and flows south into the East Fork of Mill Creek. Three shallow ponds are also located on the site.

In general, the site is underlain by relatively thin glacial drift over interbedded shales and limestones of Ordovician age. The composition of the glacial drift ranges from intermixed silt, sand and gravel, to silty, sandy clays; and its thickness ranges from zero to over 40 feet on the site. The sand and gravel deposits comprise the hills and ridges and are encountered near the surface of the central portion of the site. The silts and clays usually occur as lenses in the sands and gravel or directly overlie bedrock.

1.3.2 BACKGROUND/HISTORY

The property was originally developed as a sand and gravel mining operation, and was subsequently used as a landfill from 1934 to 1990. According to EPA studies, materials deposited at the site include demolition debris, household refuse, and a wide variety of chemical wastes. The waste disposal areas include a now-buried waste lagoon near the center of the site and a landfill. According to EPA studies, the buried waste lagoon was used for the disposal of paint wastes, ink wastes, creosote, pesticides, and other chemical wastes. The landfill area located north and northeast of the buried lagoon received predominantly demolition and landscaping debris.

In 1976, the Ohio EPA (OEPA) initiated an investigation of the site in response to reports of a black oily liquid that was observed during a fire call to the site. Before the OEPA could complete the investigation, the landfill owners, the Skinners, covered the lagoon with a layer of demolition debris. Mr. Skinner further dissuaded the OEPA from accessing the site by claiming that nerve gas, mustard gas, and explosives were buried in the landfill. The OEPA requested the assistance of the U.S. Army after obtaining this information. Mr. Skinner later retracted his statements concerning buried ordnance, and a U.S. Army records review performed in 1992 did not reveal any evidence of munitions disposal at the site.

In 1982, the site was placed on the National Priority List by the EPA based on information obtained during a limited investigation of the site. The investigation indicated groundwater contamination had occurred as a result of the buried wastes. In 1986, a Phase I Remedial Investigation was conducted that included sampling of groundwater, surface water and soil, as well as a biological survey of the East Fork of Mill Creek and Skinner Creek. A Phase II Remedial Investigation was conducted from 1989 to 1991 and involved further investigation of groundwater, surface water, soils, and sediments. A Baseline Risk Assessment and Feasibility Study (FS) were completed in 1992.

The Phase II Remedial Investigation revealed that the most contaminated media at the site is the soil from the buried waste lagoon. Lower levels of contamination were also found in soils on other portions of the site and in the groundwater, and very low levels were found in the sediments of the Mill Creek, Skinner Creek, the Duck Pond, and the Diving Pond. Migration of the landfill constituents has been limited, and the Phase II Remedial Investigation concluded that there had been no off-site migration of landfill constituents via groundwater flow.

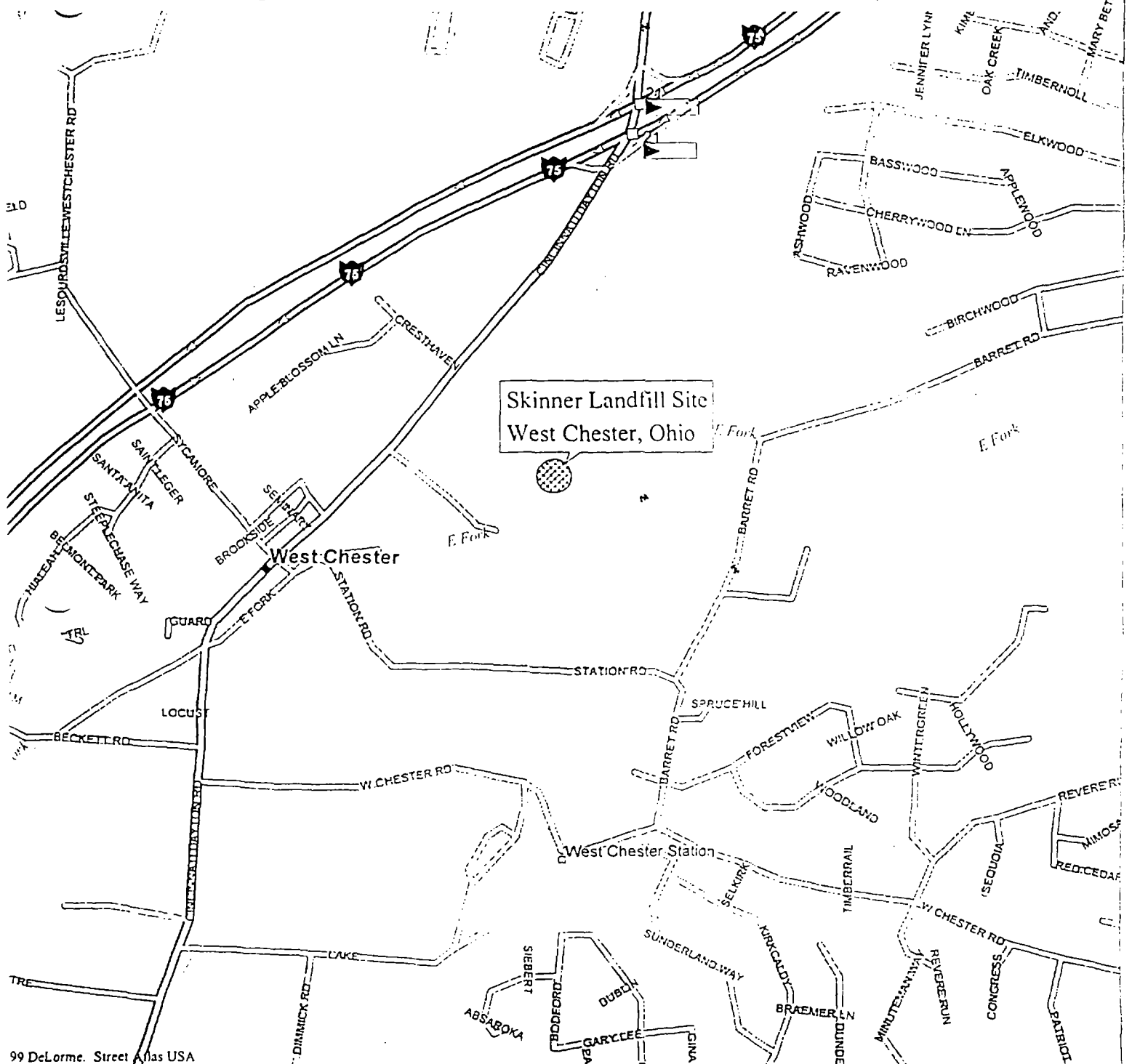
1.4 REFERENCES

This HASP conforms to the following guidelines established by the regulatory agencies in the following documents:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Code of Federal Regulations, Title 29 (29 CFR), Part 1910.120.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910.1200.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910 and Part 1926.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, Publication No. 85-115, 1985.

Figure 1 Skinner Landfill Site Location Map

Figure 1 - Site Location Map



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300 Feet
00 Meters

- | | |
|-----------------------------|---------------------|
| — Local Road | Exit/Lodging |
| — Major Connector | Exit/Food |
| — Interstate/Limited Access | Exit/Other Services |
| □ Exit | Cemetery |
| — Railroad | Water |
| □ Point of Interest | Woodland |
| ◆ Small Town | River/Canal |
| Exit/Gas | |



2.0 Scope of Work

2.0 SCOPE OF WORK

2.1 GENERAL

Earth Tech will conduct environmental services at the Skinner Landfill site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for the Skinner Landfill site.

Environmental construction services at the Skinner Landfill site include, but are not limited to, the following tasks:

- Monitor Well Installation
- Excavation of contaminated soils and placement into landfill
- Earth moving
- Landfill cap construction
- Interceptor system installation
- Installation of groundwater extraction wells, piezometers, and gas probes
- Surface water sampling
- Excavation and soil sampling
- Groundwater sampling
- Surveying

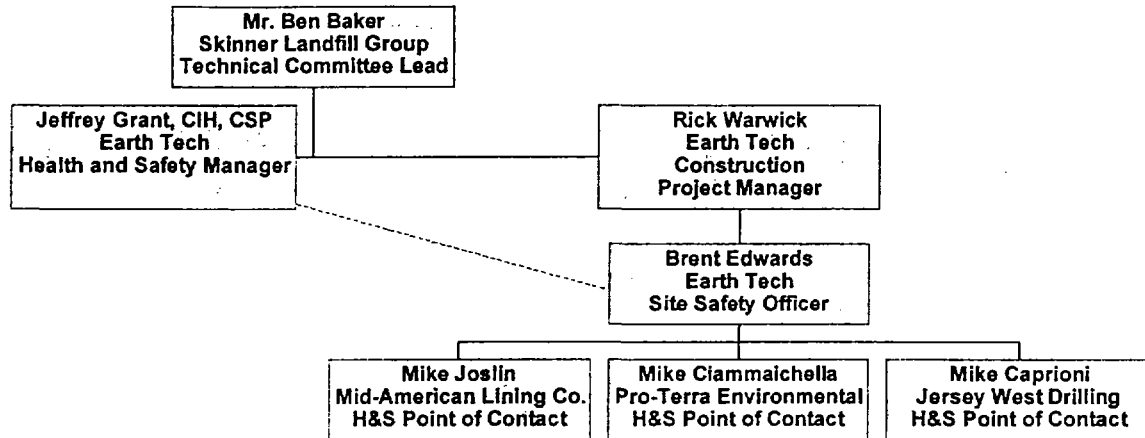
3.0 Project Health and Safety Organization

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 ORGANIZATIONAL STRUCTURES

Figure 2 shows the organizational structure of the Earth Tech health and safety management for the Skinner Landfill project.

Figure 2: Skinner Landfill Health and Safety Organization Structure



3.2 ALL PERSONNEL

All personnel are responsible for their own health and safety, for completing tasks in a safe manner, and for reporting any unsafe acts or conditions to the CPM, their supervisor and/or the Site Safety Officer (SSO). All personnel are responsible for continuous adherence to these health and safety procedures during the performance of their work. No person may work in a manner that conflicts with the letter or intent of safety and environmental precautions expressed in these procedures. Earth Tech employees are subject to progressive discipline and may be terminated for blatant or continued violations. Subcontractor employees who violate health and safety regulations will be warned via the subcontractor's supervisor; then, after due warning, will be denied access to the site.

3.3 PROJECT MANAGEMENT

The CPM will lead each project and is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The Skinner Landfill site CPM, Rick Warwick, will confer with the SSO and/or the HSM on all matters affecting health and safety. At a minimum, this will be accomplished during the daily meeting at the end of each workday.

3.3.1 CONSTRUCTION PROJECT MANAGEMENT RESPONSIBILITIES

The CPM health and safety responsibilities relating to the Skinner Landfill site include, but are not limited to:

- Ensuring that the project is performed in a manner consistent with this HASP.
- Ensuring that this plan, where required, is approved and properly implemented.
- Providing the HSM with sufficient information, reasonably in advance of projects, to allow a proper evaluation of the operational or procedural hazards.
- Ensuring sufficient funds are allocated in projects to fully implement the safety procedures required.
- Ensuring that the medical surveillance requirements within the HASP are enforced.
- Investigating and reporting accidents/incidents, and determining if modifications in work practices are required due to an accidental exposure or injury.
- Ensuring personnel are properly trained and informed about assigned tasks.

3.3.2 CONSTRUCTION PROJECT MANAGEMENT AUTHORITY

The authority of the CPM associated with health and safety programs of the project includes, but is not limited to:

- Assigning an approved SSO.
- Temporarily suspending field activities if the health and safety of personnel or bystanders is endangered, pending evaluation by the HSM.

3.4 HEALTH AND SAFETY MANAGER

The HSM, Jeff Grant, CIH, CSP, is responsible for establishing, implementing, monitoring, and administering the corporate Health and Safety Program; ensuring that the program is in compliance with all Federal, State, and/or local requirements; monitoring the effectiveness of the company's program, and making recommendations to improve it; and overseeing and coordinating all communications with Federal, State, and local safety and health agencies. This includes keeping this HASP current with new regulations and techniques, and in accordance with contract-specific health and safety requirements.

3.4.1 HEALTH AND SAFETY MANAGER RESPONSIBILITIES

The HSM health and safety responsibilities relating to the project include, but are not limited to:

- Providing technical advice to the CPM.
- Monitoring and interpreting changes in relevant regulations, technology, and work practices.
- Developing and/or providing input on all health and safety-related policies and procedures.
- Routinely evaluating the HASP, and reporting the status and recommended changes for activities associated with the program.
- Providing the CPM with guidance relative to the requirements, effectiveness, and needs of the HASP.

- Ensuring that the medical surveillance requirements within the HASP are identified.
- Ensuring that the training requirements within the HASP are identified.
- Evaluating health and safety equipment needs for this project and reporting these needs to the CPM.
- Reviewing accident investigation reports to ensure that corrective actions identified are appropriate.

3.4.2 HEALTH AND SAFETY MANAGER AUTHORITY

The authority of the HSM includes, but is not limited to:

- Approving employee qualifications to work in selected activities based on health and safety considerations.
- Approving or disapproving HASPs and supplemental documents.
- Establishing employee training and medical surveillance procedures.
- Suspending work on any project or activity that jeopardizes personnel health and safety.
- Authorizing or restricting personnel for work on hazardous waste sites based on medical and/or training status.
- Directing changes in work practices to improve health and safety.
- Acting as the official representative for safety matters within the division.
- Determining whether a change in an individual's work assignments is required due to injury, accidental exposure, or pregnancy.
- Determining the need for HASPs for specific projects or operations, or the appropriateness of specific SOPs.
- As required, meeting with clients to discuss the details of safety and health planning documents.
- Auditing facilities and field activities to evaluate performance/compliance with the Health and Safety Program on a periodic and as-needed basis.
- Directing changes in work practices to improve health and safety, and removing individuals from operations when their conduct jeopardizes the health and safety of themselves or others.
- Suspending work on any project or activity that jeopardizes the safety of anyone in the area.
- Suspending work on a project or activity if the HASP and/or protocols used appear to be inappropriate or inadequate.

3.5 SITE HEALTH AND SAFETY OFFICER

The dedicated SSO will be assigned to the Skinner Landfill project prior to the commencement of site activities.

3.5.1 RESPONSIBILITIES

The SSO is responsible to:

- Maintain data on regulatory information [e.g., OSHA, Superfund Amendments and Reauthorization Act (SARA) Title III, Right-to-Know] and be sure that timely reports are filed to appropriate agencies.

- Provide information to keep project current with new regulations, new techniques, and new topics for safety meetings.
- Provide leadership and support for the health and safety program.
- Assign sufficient personnel and allocate enough resources to implement the program at all levels.
- Monitor the lost time incidence rate for this project and work toward improving it.
- Monitor regulatory compliance and work toward zero citations and violations.
- Encourage site personnel to make safety their number one priority.
- Inspect the site at least monthly (per HSM) for regulatory violations and possible hazards in accordance with SOPs.
- Train and educate workers in methods and techniques that are most hazard-free.
- Ensure that employees understand the properties and hazards of materials to be used.
- Ensure that employees have had training in the following areas as necessary:
 1. Hazard Communication (chemical safety);
 2. Confined spaces, locations, and confined space entry procedures;
 3. Emergency operations procedures;
 4. Use and care of personal protective equipment (PPE);
 5. Electrical safety including lockout and tagout procedures;
 6. Respiratory protection and equipment; and
 7. Other appropriate topics based on the hazards at this job site.
- Conduct daily safety meetings with on-site Earth Tech personnel.
- Ensure that employees understand that they are responsible for their own safety and that they develop the right attitude toward safety practices.
- Ensure that employees have and use the proper tools, training, and equipment.
- Discipline employees who ignore safety rules and practices after attempts at training have failed.
- Monitor areas of responsibility to ensure that changing conditions do not result in human, situational, or environmental factors capable of causing accidents. Develop and implement corrective action plans to eliminate or mitigate hazards.
- Ensure that housekeeping in all areas under their control is up to the desired level.
- Ensure all injuries/illnesses/accidents and near misses are investigated in accordance with the HASP.
- Implement any monitoring programs established according to directives outlined in the HASP and its supplements.
- Forward any employee exposure monitoring information to the HSM to allow for exposure evaluation and employee notification.

At the discretion of the CPM, he may designate an on-site person as an assistant Site Health and Safety Officer.

3.5.2 SITE SAFETY OFFICER AUTHORITY

The SSO has authority to:

- Temporarily suspend field activities if the health and safety of personnel are endangered, pending further consideration by the HSM.

- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the HSM and the CPM.

3.6 EMPLOYEES

Personnel working on the Skinner Landfill site are required to read and acknowledge their understanding of this HASP and its supplements. Personnel are expected to abide by the requirements of this HASP and cooperate with site supervisory personnel to ensure a safe and healthful work site.

It is each employee's responsibility to be familiar and in compliance with all health and safety practices and to use required PPE, air monitoring equipment, and other safety devices, as required. In addition, employees shall:

- Notify the CPM of unsafe conditions and acts.
- Report all injuries, illnesses, accidents, and near-misses immediately.
- Perform all work in a safe and efficient manner.
- Seek training in any area where there are questions as to the safest and most effective way to work or use equipment.

3.6.1 EMPLOYEE RESPONSIBILITIES

It is each employee's responsibility to be familiar and comply with all health and safety practices and to use required PPE, air monitoring equipment, and other safety devices, as required. Responsibilities of employees associated with this project include, but are not limited to:

- Complying with the provisions of and following the procedures defined in the HASP.
- Providing feedback to health and safety management relating to omissions and modifications in the Health and Safety Program.
- Notifying the CPM or SSO of unsafe conditions and acts.
- Reporting all injuries, illnesses, accidents, and near-misses immediately.
- Performing all work in a safe and efficient manner.
- Seeking training in any area where questions exist as to the safest and most effective way to work or use equipment.
- Understanding the policies and procedures specified in the Health and Safety Program, and clarifying those areas where understanding is incomplete.

3.6.2 EMPLOYEE AUTHORITY

The health and safety authority of each employee assigned to the Skinner Landfill site project consists of the following:

- Refusing to work in any operation that the employee feels is unsafe, or where specified safety precautions are not adequate or understood.
- Refusing to work on any site or operation where the safety procedures specified in this HASP are not being followed.
- Contacting the HSM at any time to discuss potential concerns.

3.7 SUBCONTRACTORS

Upon entering a subcontractor agreement for work performance at the site, the subcontractor will review this HASP(s) prior to the start of work performance, and develop and submit a HASP that is in compliance with this HASP as a minimum, as well as federal and state requirements. Subcontractors are responsible for the safety and health of their employees and the submittal of the HASP for review is not for the purpose of procedure approval, but rather to ensure compliance with the contract provisions.

3.7.1 SUBCONTRACTOR RESPONSIBILITIES

Responsibilities of any subcontractors associated with the project, with respect to the health and safety aspects of the program, include the following:

- Complying with the appropriate provisions of their HASP and SOPs for work performed by their employees.
- Ensuring that subcontractor employees comply with all federal and state health and safety regulations.
- Ensuring that subcontractor employees comply with any specific safety and health provisions required by the client.

3.7.2 SUBCONTRACTOR AUTHORITY

The health and safety authority of subcontractors assigned to the project consists of the following:

- Refusing to work in any operation that the employee feels is unsafe, or where specified safety precautions are not adequate or understood.

3.8 VISITORS

Unauthorized visitors will not be permitted within established work site control zones. Authorized visitors (e.g., U.S. EPA, etc.) to any work location on the site will be briefed by the CPM on the hazards present at the location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies.

4.0 HEALTH AND SAFETY PROGRAMS

4.1 MEDICAL MONITORING AND SUPPORT PROGRAM

All personnel performing fieldwork activities at the Skinner Landfill site shall conform to the medical monitoring requirements specified below and in the SOPs prior to starting assigned work tasks.

4.1.1 PHYSICAL EXAMINATIONS

Project personnel required to perform tasks that have the potential to expose them to hazards at or above the permissible exposure levels (PELs) as defined by NIOSH/OSHA, or are required to wear respiratory protection, shall have completed (at a minimum) a physical examination in accordance with 29 CFR 1910.120(f) and the requirements of this section, as well any applicable standards governing the specific occupational exposure.

A physician specializing in occupational medicine will evaluate the results of medical examinations. The medical evaluation will include a judgment regarding the employee's ability to use respiratory protective equipment and to participate in work activities associated with the project. The examining physician will document his/her evaluation/recommendations on an appropriate Medical Clearance Form or similar form of documentation. (Earth Tech Health and Safety forms are included with the SOPs or as individual forms in Appendix A). Restrictions of site activities may be required for personnel with certain medical conditions that could be aggravated by specific chemical exposures or physical demands. The CPM is responsible for notifying the SSO and/or HSM of any employee physical or medical restrictions. The SSO, under the direction of the HSM, will then work with the project management staff to ensure that the restrictions noted for a particular employee are properly implemented. A copy of each person's applicable Medical Clearance Form will be made available for review following a request from the HSM, and shall be maintained in the employee's file.

Personnel who are potentially exposed to occupational hazards during the project will require periodic medical examinations. Site/project personnel who have not received a medical examination within 12 months (365 days) of their previous medical exam will:

- Be required to immediately obtain an appropriate medical exam and provide a copy of the Medical Clearance Form to the CPM and the SSO for review prior to starting work on the project.
- Be removed from the project until the appropriate medical exam has been performed and a copy of the associated Medical Clearance Form has been provided to the CPM and the SSO.

4.1.2 SUBCONTRACTOR PERSONNEL

Subcontractors required to perform tasks that have a potential to expose them to hazards at or above the PEL must provide appropriate documentation of medical surveillance (in accordance with 29 CFR 1910.120(f)), signed by an occupational physician, for all personnel that will be assigned to the project. This documentation must state the ability to perform the work and ability to wear respiratory protection. This documentation must be provided at least seven days prior to work start-up.

Medical certificates must be made available upon request. Any subcontractor employee whose medical certification expires must be prevented by the subcontractor from performing work until the medical re-certification is attained.

Medical certification for newly assigned employees must be provided before they begin work on the project.

4.1.3 MEDICAL ASSISTANCE

Telephone numbers and locations for local fire department, hospitals, ambulance service, police, and other emergency services shall be posted and maintained by the SSO. Information regarding non-emergency medical treatment for on-site injury, on-site illness, or on-site exposure to chemical contaminants will be provided to the hospital by the supervisor of the employee in question.

4.1.4 FIRST AID

A first-aid kit will be available and maintained at each work location for use by personnel certified in first aid and CPR by the American Red Cross or equivalent.

First-aid kits supplied for use during the Skinner Landfill site project will comply with the provisions of ANSI Standard Z308.1, "Minimum Requirements for Industrial Unit-Type First-Aid Kits."

All injuries, near misses, and vehicle accidents with or without injuries will be investigated and documented by the SSO in his working log and on the Earth Tech Supervisor's Incident Report. The Incident Report will be distributed in accordance with Section 4.2.1 of this Plan.

4.2 ACCIDENT INVESTIGATION AND PREVENTION PROGRAM

4.2.1 ACCIDENT/INJURY REPORTING

All accidents and incidents during field activities that involve any employee or subcontractor personnel associated with this project will be promptly reported to the SSO and the appropriate supervisor. The SSO will provide notification to the CPM, and the HSM as required by company policy. The supervisor of the injured employee or work crew where the accident occurred will initiate a written report that details the events surrounding the accident/incident in accordance with OSHA requirements.

For accidents and injuries involving Earth Tech personnel, the "Supervisor's Report Of Incident" form (SOP 6) will be used to ensure all relevant information is recorded. The CPM/Supervisor shall complete the "Manager" section of the form and forward it to the SSO. The SSO will then fax the form to the HSM in Grand Rapids, Michigan [(616) 940-4396] for review/reporting purposes. Copies shall be maintained in the project files.

Accidents or injuries involving subcontractor personnel will require the completion of accident/injury reports by an appropriate representative of that subcontractor, in accordance with Federal and State requirements. Following any subcontractor's completion of an accident/injury report associated with this project, the subcontractor will provide the SSO with a copy of a report that details the events surrounding the accident/injury. Additionally, corrective actions undertaken by the subcontractor to prevent

reoccurrence or modifications to the subcontractor's health and safety policies developed to inform their personnel of the hazard, will be described as well. Copies shall be maintained in the project files. OSHA and most states' occupational health and safety programs require verbal notification within 8 hours, and preferably during the same work shift, in the event of a fatality or severe injury requiring hospitalization of three or more employees (see Section 7.4). The HSM or CPM will make such notifications to OSHA for Earth Tech and, therefore, must receive the information in time to make the notification without penalty. The subcontractor shall comply with applicable notification requirements for the subcontractor employees, and must inform the CPM and SSO after notification is made.

The CPM and/or the SSO shall record in the Site Daily Activity Log information regarding who is on site and the PPE used by each worker.

4.2.2 CLIENT NOTIFICATIONS

In the event of an accident or injury during the project, the CPM will inform the HSM and the SLG of the incident and provide him/her with the appropriate information/documentation in order to initiate any additional client notifications that may be required.

4.2.3 ACCIDENT PREVENTION PROCEDURES

All site employees who work on the Skinner Landfill site shall comply with the site's accident prevention program.

4.3 HEALTH AND SAFETY TRAINING PROGRAMS

This section outlines the health and safety training programs that will be performed and maintained by personnel for the duration of the project. This HASP has not been developed to address all of the potential hazards anticipated during the performance of this program; therefore, supplemental health and safety documents will be developed to detail the specific health and safety training requirements associated with each task.

4.3.1 GENERAL HEALTH AND SAFETY TRAINING

All field personnel, including subcontractors and visitors involved with site activities will have completed the necessary health and safety training courses prior to entering restricted/controlled areas of the site (Exclusion or Contamination Reduction zones). To comply with the provisions established in 29 CFR 1910.120 (e)(2) and (e)(3) (40-hour or 24-hour initial training), the basic training topics will include, but are not limited to:

- Hazard communication
- Flammable atmospheres and ignition controls
- Toxic chemical recognition
- Exposure guidelines
- Protective clothing
- Respiratory protection
- Hearing conservation
- Heat/cold stress

- Decontamination
- Prevention of slip, trip, and fall hazards
- Safe lifting techniques and safe work practices.

All personnel will receive annual refresher training in accordance with 29 CFR 1910.120 (e)(8). Work supervisors will receive an additional required eight hours of training, which addresses supervisor responsibilities, and obligations in maintaining an effective health and safety program in accordance with 29 CFR 1910.120 (e)(4). Copies of employee HAZWOPER certification will be inserted in Appendix B prior to site activities.

Subcontractors will be prepared to provide appropriate information that documents any required training programs associated with the particular site activities being performed (e.g., forklift operations, confined space entry, etc.), and any other training required by federal or state health and safety regulations.

Additional training is required for other specific tasks that may be needed, such as confined space entry, lockout/tagout, etc. Personnel must receive the proper training prior to starting the assigned work task(s).

4.3.2 SITE-SPECIFIC TRAINING

In addition to the task-specific supplements associated with individual program locations, personnel will be:

- Instructed on the contents of applicable portions of this plan and any supplemental health and safety information developed for the program tasks to be performed.
- Made aware of task-specific physical hazards and other hazards that may be encountered during site work. This includes any client-specific required training for health and safety.
- Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure and heat stress.
- Made aware of fire prevention measures, fire extinguishment methods, and evacuation procedures.

The site-specific training will be performed at the start of the program and on a monthly basis thereafter. Training will be conducted by the SSO and will be documented on the Tailgate Safety Briefing Sign-in Log (although considered separate from the Tailgate Safety Briefings). Copies of all training shall be maintained in the project files.

4.3.3 HAZWOPER TRAINING EXCEPTIONS

OSHA regulations mandate specific training requirements for personnel involved in remediation processes and spill response. However, incidental personnel do not require HAZWOPER certification if the site characterization indicates that the potential for health and safety concerns is low, or entry is only allowed into perimeter areas. In addition, surveyors conducting work prior to excavation activities or after capping will not be required to have HAZWOPER certification. Personnel who only visit or deliver to the work site perimeters (e.g., vendors, personnel working in the support zone, etc.) are exempt from the HAZWOPER standard, and do not require certification. Visitors (including regulators) would not require HAZWOPER certification to observe work in progress from perimeter areas.

4.3.4 HAZARD COMMUNICATION

The SSO/employees shall ensure compliance with the Hazard Communication Program found in Appendix C of the Skinner Landfill HASP. This will include materials brought on the site such as, but not limited to, flammable liquids, decontamination solutions, and samples/preservatives.

4.4 PERSONAL SAMPLING

Should site activities warrant performing personal sampling of employees, the SSO, under the direction of the HSM, will be responsible for specifying the monitoring required, and ensuring employees are notified of the monitoring results in compliance with OSHA regulations and good occupational health practices. Within five working days after the receipt of monitoring results, the HSM will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the project files. In addition, copies shall be provided to the HSM for inclusion in medical records as necessary.

Should the site activities warrant, the subcontractor shall ensure its employees' exposures are quantified via the use of appropriate sampling techniques. The subcontractor shall notify the employees sampled in accordance with health and safety regulations, and provide the results to the SSO for use in determining the potential for other employees' exposure.

4.5 ENVIRONMENTAL SAMPLING

Monitoring shall be performed within the work area on site in order to detect the presence and relative levels of toxic substances, the presence of flammable or explosive atmospheres, and/or oxygen-deficient environments. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted in order to determine baseline data on potential hazards prior to entry in the work area, and periodically while conducting site work to evaluate any changes in conditions of the specific work area.

Periodic monitoring on the site will consist of initial monitoring, during changes in site conditions (e.g., excavating in a new location, opening a drum/container or well, wind direction change, etc.), and at regular intervals throughout the day, during soil excavation, handling, sampling, transportation, and decontamination activities, or as deemed necessary by the SSO. Tables 1 and 6 provide the monitoring equipment and action level requirements for this project.

Any activity conducted in a confined or enclosed area or in site buildings must be monitored for oxygen deficiency and explosion potential, as well as chemical contamination.

Table 1: Environmental Sampling

| | |
|-----------------------------|--|
| Instrument: | Photoionization Detector equipped with at least a 11.7 eV lamp |
| Frequency: | Continuously during environmental activities (e.g., excavation in contaminated areas) |
| Monitoring Location: | Breathing zone; ambient locations (including confined spaces at three feet vertical intervals throughout the space prior to entry) |

| | |
|-----------------------------|--|
| Instrument: | LEL meter/multi-gas meter (oxygen, LEL, hydrogen sulfide, etc.) |
| Frequency: | While working in potential explosive atmospheres or during confined space entry |
| Monitoring Location: | Breathing zone; ambient locations (including confined spaces at three feet vertical intervals throughout the space prior to entry) |

| | |
|-----------------------------|---|
| Instrument: | Radiation detection meter (e.g., Ludlum Micro R Meter, etc.) |
| Frequency: | While working in potential radiation (unknown contaminant) areas |
| Monitoring Location: | Immediate work locations or travel routes (including confined spaces prior to and during entry) |

4.6 CALIBRATION MONITORING EQUIPMENT

All instruments used will be calibrated in accordance with the manufacturer's recommendations (owner's manual must be included in the applicable equipment case or immediately obtained by the rental agency). If the owner's manual is not available, contact the rental agency or manufacturer for technical guidance for proper calibration. If equipment can not be pre-calibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be temporarily ceased until this requirement is fulfilled.

4.7 STOP WORK AUTHORITY

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected Earth Tech employees and subcontractors.

Upon issuing the stop work order, the SSO shall contact the CPM and request his assistance in implementing corrective action so that operations may be safely resumed. If the CPM and the SSO are unable to agree on the necessary corrective actions or the appropriateness of the stop work order, the issue shall be referred to the HSM.

Resumption of safe operations is the primary objective; however, operations shall not resume until the HSM has concurred that workplace conditions now meet acceptable safety standards.

5.0 HAZARD ASSESSMENT

5.1 SITE DESCRIPTION

The Skinner Landfill site is located in West Chester, Ohio. Reference Section 1.3 of this HASP for site information.

5.2 GENERAL HAZARDS

During the course of the Skinner Landfill Project, personnel may be exposed to a number of occupational and environmental hazards. The primary hazards anticipated for this project include:

- **Chemical Radiological Exposures:** Associated with the environmental construction services (e.g., intrusive activities involving impacted materials, excavating, sampling, system installation, and decontaminating). Site materials may contain various levels of, but not limiting to: organic compounds (e.g., acetone, benzene, etc.), coal tar pitch volatiles (phenol, etc.), polychlorinated biphenyls (PCBs), herbicides/pesticides (DDT, aldrin, etc.), inorganic metals (barium, chromium, lead, etc.) landfill gases (methane) and potential for radioactive materials. Applicable health hazard information in the form of Material Safety Data Sheets (MSDSs) is included in Appendix D.
- **Hazardous Noise:** Produced during heavy equipment operations, material handling and environmental activities that may be ongoing around the work site.
- **Walking/Working Surfaces:** Unsafe and/or elevated walking surfaces.
- **Vehicle Operation Hazards:** Associated with the operation of heavy equipment, drill rigs, support/sampling equipment and vehicles.
- **Electrical and Other Powered Machine Hazards:** Present during both the operation and maintenance of site support equipment.
- **Heat and Cold Stress Environments:** Associated with site-specific work activities, PPE usage and geographical project locations.
- **Biological Hazards:** Associated with exposures to plant/animal vectors and bloodborne pathogens. See Appendix A for the Exposure Control Plan for Bloodborne Pathogens.

It is unlikely that this HASP could anticipate all of the hazards associated with the project. Therefore, this HASP has been developed as a programmatic document outlining the protective measures for hazards most likely to be present at each project location. Hazards present at individual work locations not addressed in this HASP will be provided for either in an appropriate supplement or during the semi-annual review of this document. Supplements to this HASP are included as Appendix E.

Supplements associated with this HASP will not be developed as stand-alone documents. Each of the supplements or addenda generated for the project will be accompanied by this document at all times.

5.2.1 CHEMICAL EXPOSURES

Preventing exposure to toxic chemicals is a primary concern during any activity that may present an exposure potential to site personnel. Most areas associated with the project are not anticipated to be of substantial concern with regard to chemical exposure; however, personnel should be aware of the potential to encounter chemical contaminants while performing environmental services at the site.

Substances can enter the body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or it can act systemically, causing a toxic effect at a part of the body distant from the point of initial contact.

Chronic exposure refers to relatively low levels of exposure over a long period of time. Acute exposure refers to high levels of exposure for short periods. The differing toxicity of the chemicals anticipated must be taken into account. Chronic toxins may show no adverse health effects at the time of exposure, but could appear years later. Acute toxins may be capable of extreme health effects during or immediately after excessively high exposures, and may show no residual effects after that. Many chemicals cause both chronic and acute conditions that may vary greatly.

Based on the information from previous water analysis results, the overall chemical hazard potential for performance of work under this plan is low. Results indicate that very low levels of the subject contaminants were detected. Inhalation, ingestion, and skin contact are possible routes of exposure during project activities. The primary chemicals of potential concern are organic compounds (e.g., acetone, benzene, etc.), coal tar pitch volatiles (phenols, etc.), polychlorinated biphenyls (PCBs), herbicides/pesticides (DDT, aldrin, etc.), inorganic metals (barium, chromium, lead, etc.) and landfill gases (methane). These compounds have the potential to create an unhealthful ambient environment for site workers. A brief outline of the site contaminants' properties and exposure symptoms is included below as Table 2. The following information has been compiled from the June 1997 NIOSH *Pocket Guide to Chemical Hazards*, the 1990 State of Michigan *Occupational Health Standards Commission, Air Contaminants* and the 1999 American Conference of Governmental Industrial Hygienists (ACGIH) *Guide to Occupational Exposure Values*.

5.2.1.1 Exposure Information

Table 2: Exposure Limits

| CHEMICAL | EXPOSURE LIMITS (ppm or as designated) | | | POTENTIAL CARCINOGEN |
|-----------------------------------|--|----------------------|-------------------------------|----------------------|
| | PEL | STEL/ CEILING (C) | IDLH | |
| Acetone | 1000 | NA | 2500 | No |
| Benzene | 1 | 5 | 500 | Yes |
| 1,2-Dichloroethylene | 200 | NA | 1000 | No |
| 1,1-Dichloroethane | 100 | NA | 3000 | No |
| 1,2-Dichloroethane | 50 | 100 c | 50 | Yes |
| 1,1,2-Trichloroethane | 10 skin | NA | 100 | Yes |
| Phenols | 5 | NA | 250 | No |
| PCB-Chlorodiphenyl (42% Chlorine) | 1 mg/m ³ skin | NA | 5 mg/m ³ | Yes |
| PCB-Chlorodiphenyl (54% Chlorine) | 0.5 mg/m ³ skin | NA | 5 mg/m ³ | Yes |
| Barium (soluble compounds) | 0.5 mg/m ³ | NA | NA | No |
| Chromium | 1 mg/m ³ | NA | 250 mg/m ³ | No |
| Lead | 0.05 mg/m ³ | NA | 100 mg/m ³ (as Pb) | No |
| DDT | 1 mg/m ³ skin | NA | 500 mg/m ³ | Yes |
| Aldrin | 0.25 mg/m ³ skin | NA | 25 mg/m | Yes |

PEL = permissible exposure limit

STEL= short-term exposure limit

IDLH= immediately dangerous to life and health

NA= not applicable

ND = not yet determined

mg/m³= milligrams per cubic meter

Skin = danger of cutaneous absorption

ppm = parts per million

c = ceiling limit

5.2.1.2 Additional HAZCOM Information

Volatile Organic Compounds (VOCs)

VOCs present in the landfill material, the contaminated groundwater, and in the landfill gas may require respiratory protection. These substances can enter the unprotected body by inhalation, skin absorption, or ingestion. Exposures are generally divided into two categories, acute and chronic. Symptoms from acute exposures usually occur shortly after exposure to a high concentration of a contaminant. The concentration required to produce effects varies from chemical to chemical. Some exposures to these contaminants may cause symptoms such as burning, coughing, nausea, eye irritation, or rashes. Chronic effects may include organ damage and in some cases cancer.

Semivolatile Organics

Semivolatile organics identified on the site include a number of coal tar pitch volatiles such as benzo(a)pyrene, phthalates, naphthalene, and phenol. Under typical site conditions, these materials are not anticipated to volatilize into the breathing zone. Exposure to these materials is more likely via dermal contact or incidental ingestion. Coal tar pitch volatiles are suspect carcinogens. Other effects include skin irritation or dermatitis and irritation to the mucus membranes.

Herbicides/Pesticides

Other organic material detected on the site include DDT and aldrin. These compounds are typically not volatile and potential exposure is via inhalation of contaminated dust, dermal contact, or incidental ingestion. Exposure effects include central nervous system effects such as dizziness, headaches, trembling, etc. Effects of chronic exposure to pesticides can include organ damage and cancer.

Inorganics/Heavy Metals

Inorganics identified at the site include: arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, zinc, and cyanide. Some of the heavy metals identified were at or near levels expected in background soils and bedrock. Cyanide detections have been limited. In general, exposures to heavy metals can cause respiratory and central nervous system effects when inhaled or ingested. Some metals are suspected carcinogens and have the potential to impact organs such as the liver, kidneys, and brain. The most likely route of exposure to these chemicals at the Skinner Landfill site is via inhalation and incidental ingestion of contaminated dust. Surface contamination of the site is limited. Cyanide exposure can lead to central nervous system effects and organ damage. Higher concentrations of cyanide can lead to asphyxiation.

Oxygen Deficiency

Microbial activity in a landfill, which produces methane gas, uses available oxygen, thus producing an oxygen-deficient atmosphere. Effects of oxygen deficiency in humans are impaired attention, drowsiness, nausea and vomiting, brain damage, unconsciousness, and death. Concentrations of less than 19.5 percent oxygen are considered to be oxygen deficient.

Landfill Gases

Methane gas, which is produced by microbial activity in a landfill, may act as a hazardous compound in two ways. First, methane is a flammable gas and may combust when ambient concentrations are between 5 and 15 percent. Second, methane displaces the oxygen normally breathed in the air and is therefore a simple asphyxiant. There is no smell to methane, and it is not irritating to eyes, nose, or throat; however, methane in landfill gas is easily detected by the indicative odor of decomposing refuse. If inhaled in large quantities, dizziness, difficulty in breathing, and loss of consciousness may occur.

Hydrogen sulfide has a strong rotten egg odor; however, exposure over time desensitizes the sense of smell. Workers, therefore, cannot be relied upon to determine the degree of exposure. Hydrogen sulfide affects the respiratory system, lungs and eyes, and causes dizziness, headache, and fatigue.

Vinyl Chloride: Based on available laboratory analysis from samples collected in April, 1999, exposure to vinyl chloride is not anticipated during the Construction Phase activities at the Skinner Landfill site. However, monitoring for vinyl chloride will be performed in accordance with Table 6.

Vinyl chloride is a carcinogen in humans and has been shown to cause liver, brain and lung cancer. Vinyl chloride is a colorless gas, which is usually shipped as a liquid and is used to make plastics, adhesives and other chemicals. It has a faintly sweet odor with an odor threshold of approximately 10 to 20 parts per million (ppm). Exposure can cause headache, dizziness, fatigue, weakness, sleeping disturbances and loss of memory. Higher levels can cause workers to feel lightheaded and to pass out. Long-term exposure can damage the liver, nervous system, lungs, skin and blood vessels in the hands. Vinyl chloride is a highly flammable and reactive chemical and is a dangerous fire and explosion hazard.

Polychlorinated Biphenyls

PCBs target the skin, eyes, eyelids, blood, and liver, via skin contact/absorption and inhalation. Health effects of accidental exposure to PCBs may include acne-form eruptions; eye discharge; swelling of the upper eyelids; hyperpigmentation of skin, nails, and mucous membrane; chloroacne; distinctive hair follicles; fever; hearing difficulties; limb spasms; headache; vomiting; and diarrhea. PCBs are potent liver toxins that can be absorbed through unbroken skin in hazardous amounts without immediate pain or discomfort. Severe health effects can develop later. In experimental animals, prolonged or repeated exposure to PCBs by any route, even at levels below those reported to have caused cancer in rodents, results in liver damage.

The PELs/TLVs for chlorodiphenyl (42% and 54%), as outlined by OSHA and the ACGIH, have been set at 1.0 and 0.05 milligrams per cubic meter (mg/m³) respectively, with a skin notation. The skin notation refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or by direct skin contact.

Leachate Seeps

Leachate seeps are common around landfills; however, on the Skinner site, large areas of leachate outbreaks have not been identified. Leachate can irritate skin and may have an odor. It is commonly 10 to 100 times more polluted than raw wastewater. Any liquid either ponded on or seeping from a waste fill is leachate. Personnel should avoid contact with leachate.

5.2.1.3 Physical Information

Table 3 provides additional information regarding the contaminants of concern.

Table 3: Physical Information

| Chemical | ~Vapor Pressure (mm) | Ionization Potential (eV) | LEL/UEL (Percent) | Specific Gravity |
|-----------------------------------|----------------------|---------------------------|-------------------|------------------|
| Acetone | 180 | 9.69 | 2.5 / 12.8 | 0.79 |
| Benzene | 75 | 9.24 | 1.2 / 7.8 | 0.88 |
| 1,2-Dichloroethylene | 180-265 | 9.65 | 5.6 / 12.8 | 1.27* |
| 1,1-Dichloroethane | 182 | 11.06 | 5.4 / 11.4 | 1.18 |
| 1,2-Dichloroethane | 64 | 11.05 | 6.2 / 16 | 1.24 |
| 1,1,2-Trichloroethane | 19 | 11 | 6 / 15.5 | 1.44 |
| Phenol | 0.4 | 8.5 | 1.8 / 8.6 | 1.06 |
| PCB-Chlorodiphenyl (42% Chlorine) | 0.001 | NA | NA | 1.39* |
| PCB-Chlorodiphenyl (54% Chlorine) | 0.00006 | NA | NA | 1.38* |
| Barium | 52.6 | 0 | NA | 3.51 |
| Chromium | 18.4 | 0 | NA | 7.14 |
| Lead | 37,200 | 0 | NA | 11.34 |
| DDT | 0.0000002 | NA | NA | 0.99 |
| Aldrin | 0.00008 | NA | NA | 1.6 |

eV = electron volts
 mm = millimeters
 NA = not applicable
 ~ = approximate
 LEL = lower explosion limit
 UEL = upper explosion limit
 mg/kg = milligrams per kilogram
 * = at 77°F

5.2.1.4 Symptom/First Aid Information

Exposure symptoms and applicable first aid information for each material listed above can be referenced from the MSDSs in Appendix D of this HASP.

5.2.2 HEAT STRESS

Heat stress is a major hazard, especially for workers wearing protective clothing. The same protective materials that shield the body from chemical exposure also limit the dissipation of body heat and moisture. Personal protective clothing can therefore create a hazardous condition. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties. Reference SOP 17 in Appendix A for additional heat stress information.

5.2.2.1 Heat Stress Monitoring

For monitoring the body's recuperative ability from excess heat, the following techniques will be used as a screening mechanism. Visual monitoring of personnel wearing protective clothing will begin when the ambient temperature is 75°F or above. This visual monitoring will look for signs of potential heat stress, including dizziness and tiredness.

OBSERVATION CONCENTRATING ON HEAT STRESS SYMPTOMS

When visual symptoms of heat stress are observed, or when wearing protective equipment when the ambient temperature is above 85°F, the heart rate (HR) should be measured by the radial pulse after 2 minutes in a resting period. The HR at the beginning of the rest period should not exceed 120 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. If the pulse rate is 120 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. If data on heart rate approaches maximum heart rates (220 beats per minute minus the person's age in years) at any time, medical attention will be sought.

Body temperature should be measured orally with a digital clinical thermometer in the morning as early as possible in each resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 1°F above the morning's baseline temperature. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the OT exceeds these guidelines at the beginning of the next period, the following work cycle should be further shortened by 33 percent. OT should be measured again at the end of the rest period to make sure that it has dropped below 100.0°F.

Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weightings; preferably the worker should be nude. The scale should be accurate to plus or minus ¼ lb. Workers should be instructed to increase their daily intake of fluids and the weight lost should be monitored closely.

Ideally, body fluids should be maintained at a constant level during the workday. This requires replacement of electrolytes lost in sweat as well.

5.2.2.2 Prevention of Heat Stress

One of the major causes of heat casualties is the depletion of body fluids. On the site there will be plenty of fluids available. Personnel should replace water and electrolytes lost from sweating. Commercial mixes such as Gatorade can replace electrolytes. Avoid hot drinks such as coffee and tea, carbonated beverages, or beverages containing alcohol or caffeine.

One or more of the following control measures can be used to help control heat stress and are mandatory if heat stress is detected by elevated resting heart rate above 110 beats per minute.

1. Employees should drink plenty of water throughout the day and should increase their salt intake slightly by salting their food a little heavier.
2. On-site drinking water will be kept cool, 10-15°C (50-60°F), to encourage personnel to drink often.
3. A work regimen that will provide adequate rest periods for cooling down will be established, as required.
4. All personnel will be advised of the dangers and symptoms of heat stroke and exhaustion.
5. Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
6. Supervisors shall reinforce training daily for workers to monitor themselves and their co-workers for the effects of heat disorders and to take additional breaks, as needed.
7. All breaks are taken in a protected rest area.
8. Employees shall not do other tasks during rest periods.
9. Employees shall remove impermeable garments during rest periods.
10. All employees shall be informed of the importance of adequate rest, acclimatization, and proper diet in the prevention of heat stress.

Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

5.2.3 COLD STRESS

Cold injury (frostbite and hypothermia) may impair a person's ability to work. Low temperatures and wind chill factors should be considered. This section, along with SOP 41 (Appendix A), provides information on cold stress and procedures for preventing and dealing with cold stress. Adverse cold climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability.

5.2.3.1 Cold Stress Effects

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the skin, or result in profound generalized cooling, causing death. Body areas with high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- **Frost nip or initial frostbite:** characterized by suddenly blanching or whitening of skin.
- **Superficial frostbite:** skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- **Deep frostbite:** tissues are cold, pale, and solid; extremely serious injury.

5.2.3.2 Exposure Limits and Cold Stress Monitoring

Typical exposure limits for work in cold temperatures are presented in Table 4, as a guide for establishing work schedules. Air temperature data and worker exposure times shall be monitored when the ambient temperature is 45°F or below.

5.2.3.3 Control Measures

The dead air space between the warm body and clothing and the outside air is essential. Clothing is worn to keep body warmth in and cold out. Usually, no one type of clothing is best for all weather conditions. Denim is relatively loose-woven, and not only allows water to penetrate, but permits wind to blow away the body heat that should remain trapped between the body and clothing. Duck or goose down is good for stopping wind, but is of little use when wet. Plastic or closely woven nylon is good protection from wind and rain, but offers little insulation against cold.

Many layers of relatively light clothing with an outer shell of windproof material maintain body temperature much better than a single heavy outer garment worn over ordinary indoor clothing. The more air cells each of these clothing layers has, the more efficiently it insulates against body heat loss. Make sure that clothing allows some venting of perspiration because wet skin will freeze more rapidly than dry skin; use all feasible means to keep as dry as possible. Make full use of windbreaks and avoid exposing skin to the direct effects of wind. The need to wear layers of special clothing may make the wearer very clumsy in performing many routine work procedures. Increased body dimensions must also be considered if tight spaces are encountered.

- **Frostnip:** Frostnip is not a freezing injury; rewarming should be attempted at the site. Immersion in warm water (100°F to 110°F) is preferred. An alternative method of rewarming is to provide direct contact with the employee's own skin or another person's skin.
- **Frostbite:** Thawing of the injured area should never be attempted if there is likelihood that refreezing may occur. Keeping the extremity frozen, even for hours, is preferable to thawing followed by refreezing. Therefore, the injured area should be protected and the victim should receive medical attention immediately.

Table 4: Maximum Daily Limits for Exposures at Low Temperatures

| Temperature Range | | Maximum Daily Exposure |
|---|-----------------------------|---|
| <i>Celsius (degrees)</i> | <i>Fahrenheit (degrees)</i> | |
| 0 to -18 | 30 to 0 | No limit, providing the person is properly clothed. |
| -18 to -34 | 0 to -30 | Total work time: 4 hours. Alternate 1 hour in and 1 hour out of the low-temperature area. |
| -34 to -57 | -30 to -70 | Two periods of 30 minutes each, at least 4 hours apart. Total low-temperature work time allowed: 1 hour. (Note that some difference exists among individuals. One report recommends 15-minute period, but not over four periods per 8-hour work shift. Another limits periods to 1 hour out of every 4 hours, with a low chill factor (i.e., no wind). A third says that continuous operation for 3 hours at -53°F has been experienced without ill effects). |
| -57 to -73 | -70 to -100 | Maximum permissible work time: 5 minutes during an 8-hour working day. At these extreme temperatures, completely enclosed headgear, equipped with a breathing tube running under the clothing and down the leg to preheat the air, is recommended. |
| Source: NSC Data Sheet 465, Cold Room Testing of Gasoline and Diesel Engines. | | |

5.2.4 HAZARDOUS NOISE

Work around large equipment often creates excessive noise. The effects of noise can include physical damage to the ear, pain, and temporary and/or permanent hearing loss. Workers can also be startled, annoyed, or distracted by noise during critical activities.

If workers are expected to work where noise levels exceed an 8-hour time-weighted average (TWA) sound level of 90 dBA (decibels on the A-weighted scale), administrative or engineering controls must be used. In addition, whenever employee noise exposure equals or exceeds an 8-hour TWA sound level of 85 dBA, workers must enroll in a continuing, effective hearing conservation program (reference SOP 42 in Appendix A for more detailed information regarding hearing conservation).

5.2.4.1 Noise Exposure Monitoring

Exposure to excessive noise can cause permanent hearing loss. If an excessively high noise level is believed to exist, noise monitoring may be performed. When required, continuous noise measurements will be taken using a calibrated meter on the A-weighted scale set to the "slow" response. Impact noise measurements should be taken using a meter capable of recording peak levels in decibels. Measurements should be taken at times representative of both maximum and typical levels. This will determine if the noise levels are high enough to require engineering controls or PPE.

If engineering controls cannot be used, or if they fail to reduce sound levels to acceptable levels, employer-provided protective equipment will be available and used. All employers associated with renewal activities will ensure that employees exposed to levels at or above those listed in Table 5 will wear appropriate hearing protection. Hearing protection may be worn at noise levels below this for employee comfort, as long as the equipment does not impair the worker's awareness of the work environment.

The selection of the type of hearing protection will depend on comfort, convenience, and attenuation capabilities. Assigned hearing protection must have sufficient capabilities to reduce the noise levels reaching the ear to below the levels discussed in this section. Contact the SSO for guidance, and refer to Table 5 below.

Table 5: Allowable Noise Levels

| CONTINUOUS NOISE | | IMPACT NOISE | |
|------------------|----------------|--------------|-------------------|
| Sound Level, dBA | Duration Hours | dB Peak | Frequency per Day |
| 90 | 8 | 130 | 1,000 |
| 95 | 4 | 120 | 10,000 |
| 100 | 2 | | |
| 105 | 1 | | |
| 110 | 0.5 (30 min.) | | |
| 115 | 0.25 (15 min.) | | |
| >115 | 0.125 (7 min.) | | |

5.2.5 EXCAVATION AND TRENCHING

The following safe operating guidelines must be adhered to when individuals must dig or enter excavations or trenches greater than 5 feet in depth as referenced in 29 CFR 1926.650, and SOP 22 (Appendix A).

5.2.5.1 Excavation Construction Guidelines

1. Excavated materials will be stored and retained at least 3 feet from the edge of the excavation. (Note: this procedure should be observed even when excavation/trench entry will not occur).
2. Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
3. All slopes will be excavated to at least the appropriate angle of repose, except for solid rock areas. The determination of the angle of repose and design of the supporting system will be based on these factors: depth of cut; possible variation in water content of the materials while the excavation is open; anticipated changes from exposure to air, sun, water, or freezing; loading imposed by structures, equipment, overlying material, or stored material; and vibration from equipment, blasting, traffic, or other sources. The angle of repose will be flattened when an excavation encounters wet conditions, silty materials, loose boulders, and areas where erosion and deep frost action occur.
4. Support systems (i.e., piling, cribbing, shoring, trench boxes, etc.) will be planned and designed by a qualified person when the excavation is in excess of 20 feet in depth, or subject to vibration or groundwater.
5. Materials used for sheeting, sheet piling, cribbing, bracing, and underpinning will be in good, serviceable condition.
6. Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
7. All ladders used in excavation operations will be in accordance with the requirements of 29 CFR 1926 Subpart L.

8. Excavations may be entered/exited by use of ladders or ramps. The use of buckets, forklifts, or any other machinery not designed for personnel transportation is prohibited at all times and such use will be cause for removal from the site. (Reference SOP 26 in Appendix A for detailed forklift operating procedures.)
9. Where ramps, walkways, or bridges are used for employees or equipment, they will be designed and constructed by a qualified person in accordance with accepted engineering requirements. When personnel are requested to be in excavations 5 feet or more deep, an adequate means of exit, such as a ladder or steps, will be provided.
10. Excavations will be inspected daily, or more often as conditions warrant, by a competent person to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibrations, or nearby equipment operation have not caused weakening of sides, faces, and flows.
11. Diversion ditches, dikes, or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.
12. When mobile equipment is used or allowed adjacent to excavations, stop logs or barricades will be installed. The grade will always be away from the excavation.
13. In locations where oxygen deficiency or air contaminants are possible, air samples will be taken in the excavations prior to entry of the excavation. Controls will be established to ensure acceptable atmospheric conditions. Emergency rescue equipment will be readily available where adverse atmospheric conditions may exist or develop during an excavation.
14. Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used upon the direction of the SSO. (Note: this housekeeping procedure should be observed even when excavation/trench entry will not occur.)
15. Field personnel shall enter an excavation that does not meet entry requirements for no reason except to rescue injured individuals who have fallen into the excavated area.

5.2.5.2 Trench Entry Requirements

These requirements will be enforced whenever personnel are required to enter trenches or excavations.

1. Expected hazardous ground movement areas and banks more than 5 feet high will be shored, laid back to a stable slope, or equivalent.
2. Sides of trenches in unstable or soft material 5 feet or more in depth will be shored, benched, sheeted, braced, sloped, or equivalent.
3. Sides of trenches in hard compact soil, including embankments, will be shored or otherwise supported when the trench is 5 feet or more in depth and 8 feet or more in length.
4. Materials used for sheeting, sheet piling, bracing, shoring, and underpinning will be in good, serviceable condition. Care should be taken not to over-stress the lumber being used at an excavation.
5. Additional precautions by way of shoring and bracing will be taken to prevent slides or cave-ins when excavations are subjected to vibrations.
6. When trenches are shored, the standard shoring system will meet the minimum requirements.

5.2.6 CONFINED SPACE ENTRY

This section provides confined space entry requirements for all employees, should it be necessary. These procedures do not apply to other workers on the site. Each employer on the site is responsible for the safe

entry procedures for their employees. Client procedures may specify additional requirements.

1. Definitions.

- a. Confined spaces are defined as locations that:
 - 1) Allow for entry of a worker.
 - 2) Are not meant for routine human occupancy.
 - 3) Have restricted means of egress.
- b. There are two types of confined spaces recognized by the Safety and Health regulations:
 - 1) Permit-required confined spaces- Spaces where hazardous atmospheres may exist, and require the full entry procedures of this Section.
 - 2) Non-permit-required confined spaces- Spaces where either hazardous atmospheres will not occur, or, the potential hazard is controlled through means such as ventilation. These spaces do not require full entry procedures, however they do require specific procedures (i.e. turn on ventilation) for entry. An example of a non-permit-required confined space would be a tank (e.g., clarifier or sludge tanks) under construction (note: a tank undergoing repairs may not meet this definition).

2. Inventory of All Confined Spaces.

- a. An inventory of confined spaces shall be developed for applicable work sites. This inventory shall include the type of space and the specific location. This inventory shall be maintained at the site, and updated as necessary. Confined spaces that may exist but are not accessible to employees (not on the specific work site) are not required to be inventoried.
- b. Subcontractors shall be provided with the confined space inventory for use in the development of procedures to protect their employees.
- c. If, through the actions of any contractor, a confined space is either created or brought on site, the contractor shall provide this information to all other employers on site to allow for employee protection.
- d. Examples of confined spaces to be noted in the inventory include:
 - 1) manholes
 - 2) tanks/tank trucks
 - 3) excavations/pits

3. Determination of Permit versus Non-Permit Confined Spaces.

- a. Confined space entry procedures shall be implemented by employees if entry is required into non-permit-required confined spaces where the work being performed introduces a hazard (e.g., spray painting, welding).
- b. Permit-required confined spaces shall be entered only in accordance with the provisions of this section.
- c. All permit-required confined spaces shall be labeled so that employees are adequately warned of the potential for hazardous atmospheres.
- d. When non-permit-required confined spaces require the implementation of confined space entry procedures because of specific work operations (e.g., painting, welding), all

entry points shall be labeled so as to alert all employees of the existence of the hazardous conditions. These signs shall be removed only when the hazard no longer exists (e.g., complete curing of the paint).

4. Procedures Prior to Entry.

- a. Obtain a copy of the Permit-Required Confined Space form. Determine which space will require entry, and what potential hazards may be present (include hazards associated with the work process).
- b. Select the appropriate equipment to measure the potential hazards. As a minimum, select a multi-gas meter capable of measuring oxygen levels, and combustible gas as percent of the lower explosion limit (LEL). Additional instrumentation or detectors shall be selected as needed. For example, a hydrogen sulfide detector shall be used for entry into manholes, detector tubes shall be used where hazardous levels of specific chemicals (e.g., benzene) are suspected. Contact the HSM for assistance as needed.
- c. Determine the acceptable values for the hazardous conditions being measured, based on the equipment in use and the field calibration method. This includes determining the differences expected based on the actual calibration standard (e.g., methane or pentane typical for combustible gas meters), and the anticipated hazard. This information is available from the instrument manufacturer.
- d. Ensure all the equipment selected is within current manufacturer calibration.
- e. Perform field calibration as follows:
 - 1) Combustible gas meters shall be calibrated using appropriate span gas for the detectors to be used. This span gas calibration shall be performed each time the instrument is turned on.
 - 2) Detector tube pumps shall be checked for leakage using the manufacturer's procedures prior to each day's use.
 - 3) Photoionization detectors (PIDs) shall be calibrated using isobutylene, or other material, in accordance with the manufacturer's directions.
 - 4) Other instrumentation shall be calibrated in accordance with manufacturer's directions.
- f. Set up barricades around the space being entered as required. Set up any rescue or retrieval systems.
- g. Institute any required lockout/tagout procedures that are needed (i.e., electrical, steam, liquid flow-pipe blanking)
- h. Ensure that a second person (attendant) is available, and assists in the set-up procedures.
- i. Ensure a means of communication is agreed upon between the entrant and the attendant.
- j. Complete a Confined Space Entry Permit. Have the attendant verify the completion of the required actions, then the Entrant Supervisor shall sign the Permit upon verification of completed actions. The Permit shall be maintained at all authorized entry sites.

5. Entry Procedures.

- a. Carefully remove any access doors or covers. Check the area around the seal to ensure that no flammable situations exist prior to door or cover removal.
- b. Don any required PPE.

- c. Upon removal of the access, check the immediate atmosphere using remote testing procedures to ensure the immediate atmosphere is safe. If any of the parameters being tested are outside accepted ranges (see Permit-Required Confined Space SOP in Appendix A for routine acceptable ranges; contact SSO for ranges not specified), do not enter. Use exhaust ventilation to either remove the contaminant(s) or to correct the oxygen-deficient atmosphere.
 - d. If the initial test(s) are within allowable ranges, then slowly enter the space, continually testing the atmosphere in front and to the sides. The entire area where work is to be performed shall be tested prior to performance of any work.
 - e. Perform the work. Place the direct read instruments in a location that will not interfere with the work, allow for continual monitoring, and allow for noting any alarms which may activate.
 - f. Upon work completion, pick up all equipment and leave the space.
6. Post Entry Procedures.
- a. Replace all access covers.
 - b. Ensure all signs are visible and legible.
 - c. Remove all lockout/tagout equipment.
 - d. Note on the permit any problems encountered while in the space.
 - e. Finish the permit, and turn in to the Entrant Supervisor.
 - f. The Entrant Supervisor shall inspect the permit for completion, and investigate any noted problems. Actions taken to correct noted problems shall be discussed with all authorized entrants and attendants for future implementation.
 - g. The completed permit shall be maintained on file as required in this section.
7. Training.
- a. Authorized entrants shall be trained in the following areas:
 - 1) the requirements of the applicable regulation, and the provisions of this section.
 - 2) the selection, calibration and use of air measurement equipment.
 - 3) the use and completion of the Confined Space Entry Permit.
 - 4) the potential hazards associated with confined space entry, and the methods of detecting the hazards.
 - 5) means of protection for anticipated hazards.
 - b. Authorized attendants shall be trained in the following areas:
 - 1) the areas outlined under authorized entrants.
 - 2) emergency notification requirements.
 - 3) authorized emergency response procedures.
 - c. Entry Supervisors shall be trained in the following areas:
 - 1) the areas outlined under authorized attendants.
 - 2) accident and problem investigation techniques.
 - 3) recordkeeping requirements.

- d. All other employees shall be trained:
 - 1) to recognize confined spaces.
 - 2) not to enter confined spaces.
- 8. Recordkeeping.
 - a. Inventories of confined spaces shall be maintained until one year past project completion.
 - b. Confined Space Entry Permits shall be maintained for a minimum of one year.
 - c. Any airborne measurements, which represent employee exposure, shall be maintained in accordance with the provisions of this manual regarding medical records.
- 9. Multi-Employer Work Sites.
 - a. Earth Tech employees shall perform confined space entry procedures for Earth Tech employees only. All other site personnel shall perform confined space entry procedures in accordance with federal and state regulations and their own requirements.
 - b. Earth Tech personnel shall not enter confined spaces using other employers' completed Permits.

5.2.7 ELECTRICAL SAFETY

This section and SOP 28 (Appendix A) outline electrical safety practices to prevent electrical injuries to employees and to protect client and other property. This is primarily concerned with electrical power service equipment, electrical distribution systems and testing, and trouble-shooting electronic equipment.

5.2.7.1 Instructions

Instructions to be observed when performing equipment maintenance activities include, but are not limited to:

- 1. Observe all equipment operating procedures as recommended by the manufacturers.
- 2. Appropriately ground all electrical equipment.
- 3. Provide standard warning signs to identify the electrical hazards, their exact location, and actions necessary to avoid the hazard.
- 4. Observe good housekeeping practices at all times. Give attention to keeping work areas clear around switches, terminals, controls, etc.
- 5. Identify circuit breakers and cut-off switches to indicate equipment controlled.
- 6. Do not perform work on electrical or electronic equipment unless adequately illuminated.
- 7. Use protective equipment such as rubber mats, rubber gloves, and insulated tubing wherever operations warrant.
- 8. Wear approved eye and face protection while working around high voltages.

5.2.7.2 Treatment in Case of Injury

The nearest medical treatment facility (i.e., 911) is notified in all cases involving injury from electrical shock.

5.2.8 EQUIPMENT LOCKOUT/TAGOUT

This section establishes the minimum requirements for lockout of energy sources that could cause injury to personnel due to unexpected energizing, start-up, or release of stored energy during the operation, repair, or maintenance of equipment or a process. See Appendix A for Earth Tech's SOP.

Only authorized employees shall perform the lockout procedure. All authorized employees shall receive training in recognition of the applicable hazardous energy sources and in adequate methods and means for their isolation.

For activities that require more comprehensive control procedures, a lockout/tagout program will be developed in accordance with 29 CFR 1910.147. SOP 21 provides additional lockout/tagout program guidance.

5.2.8.1 Instructions

Instructions to be observed when performing lockout/tagout activities include, but are not limited to:

1. Notify all affected employees that a lockout is required and the reason therefore.
2. Shut down operating equipment by normal stopping procedures (depress stop button, open toggle switch, etc.).
3. Make sure power sources (electrical, mechanical, hydraulic, etc.) are disconnected or isolated from the equipment. Stored energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc., must also be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
4. Lockout the energy-isolating devices with an assigned individual lock. If the device(s) cannot accommodate a lock, contact the site health and safety officer to approve any alternate methods of protection or warning (e.g., tagout, barricade, etc.).
5. After ensuring that no personnel are exposed and to ensure that the energy sources have been disconnected, operate the push button or other normal operating controls to make certain the equipment will not operate.

CAUTION: Return operating control to neutral position after the test.

5.2.8.2 Restoring Equipment to Service

When the operation is complete and equipment is ready for testing or normal service, check the equipment area to see that no one is exposed. When the equipment is all clear, remove all locks. The energy-isolating devices may be operated to restore energy to equipment.

SPECIAL CAUTION: When restoring pressurized air to an equipment/process, keep all personnel clear of machine pinch points.

5.2.8.3 Procedure Involving More Than One Person

In the preceding steps, if more than one individual is required to lock out equipment, each shall place his/her own personal lock on the energy isolating device(s). Project management may lock out equipment for the whole crew. In such cases, it shall be the responsibility of that individual to carry out all steps of the lockout practice and inform the crew when it is safe to work on the equipment. Additionally, the CPM shall not remove a crew lock until it has been verified that all individuals are clear.

Employees authorized to perform lockout shall be certain as to which switch, valve, or other energy-isolating devices apply to the equipment being locked out. More than one energy source (electrical, mechanical, etc.) may be involved. Project management shall clear any questionable identification of sources.

5.2.9 VEHICLE SAFETY

The following requirements will be observed during operation of any vehicle or equipment. Reference SOP 33 in Appendix A for detailed vehicle/equipment safety guidelines.

5.2.9.1 Standard Operating Procedures

Vehicles are not to be driven at a speed greater than the maximum limit allowed in the area or posted on the roadway. In no event are vehicles driven at a speed greater than is reasonable and prudent, giving due regard to the type of vehicle, visibility, road conditions, traffic, or other conditions or circumstances.

Operators whose alertness is impaired by illness, fatigue, alcohol, drugs, or who are otherwise physically unfit are not allowed to drive a fleet vehicle. Sleeping in parked vehicles with the engine or heater in operation is prohibited.

5.2.9.2 Vehicle Safety

All vehicles associated with the project will be maintained in a safe condition. Maintenance will be performed in accordance with recommended instructions of the manufacturer. The following rules will be observed when performing work activities associated with the project, including during travel to and from work sites/locations.

1. Employees are responsible for any vehicle assigned to them; therefore, they must periodically check the gas, oil, tires, battery, etc.
2. No open flames are permitted when inspecting the vehicle. Vehicles are not to be operated if an unsafe or defective condition is found or suspected.
3. Identified deficiencies or hazards should immediately be reported to the SSO by employees.
4. Standing in moving vehicles is prohibited.
5. Personnel will be transported only in passenger-carrying vehicles.
6. When more than one person other than the driver is transported in a cargo or maintenance-type vehicle, adequate fixed seating and protection from shifting cargo will be provided and used.
7. Gasoline and other hazardous materials will not be carried in the passenger-carrying compartment of any vehicle.
8. Safety belts must be worn by all occupants.

9. Vehicles with limited rear visibility will not be backed without an additional person serving as a spotter. The spotter will be positioned behind the vehicle at a safe distance and appropriately direct the driver to avoid an accident/incident when backing up.

5.2.9.3 Safety Devices

The following safety device requirements shall be used at all times as applicable:

1. Seat belts are required in all sedans, carry-alls, vans, and trucks.
2. Safety chains or cables are required for all trailers to prevent the towed vehicle from breaking loose in the event the tow-bar fails or becomes disconnected.

5.2.9.4 Transport of Cargo

The following requirements shall be observed for all cargo transport:

1. The transport of hazardous materials over public roadways shall be in accordance with Department of Transportation (DOT), U.S. EPA, and state requirements and regulations.
2. Vehicles are not loaded beyond their rated capacity. The load must not obscure the operator's view or in any way interfere with safe operations.
3. Heavy loads are properly distributed on the truck bed or trailer to avoid overloading individual tires or axles even though the load is within the rated capacity of the vehicle.
4. Loads shall be properly secured at all times.
5. Appropriate warning signs will be affixed to the vehicle in accordance with DOT regulations and local traffic ordinances.

5.2.9.5 Motor Vehicle Incident Reporting and Investigation

All motor vehicle incidents shall be reported immediately to the SSO and subsequently to the HSM and the CPM. Incidents will be investigated in accordance with Section 4.2.1 of this Plan.

5.2.10 SLIPS, TRIPS, FALLS, AND PROTRUDING OBJECTS

In addition to the hazards present when working in elevated areas, hazards from protruding objects, careless movements, or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to prevent such injuries.

5.2.11 ELEVATED WORK AREAS

To minimize the potential for injuries due to falls or dropping tools or equipment, the following procedures and the information in SOP 27, Portable Ladders and Work Platforms (Appendix A), will be observed when working at elevated heights:

- Access to elevated work locations shall be provided through the use of ladders. Such ladders will be sufficiently sturdy, and secured to ensure safety during use. All provisions of 29 CFR 1926.25 through 1926.27 shall be observed; ladders should be inspected prior to each use, or daily if in continuous use, for broken or missing rungs, damaged feet, etc.

- Fall protection must be provided for all elevated work locations that expose workers to a fall of 6 feet or more. Fall protection may consist of fall prevention, such as standard guardrails or lifeline and lanyard/tether, or fall arrest system, such as net or body harness with shock-absorbing lanyard.

5.2.12 CRANES, DERRICKS, AND HOISTS

Only qualified personnel shall operate cranes, derricks and hoists. See SOP 25, Cranes and Lifting Devices, for further information.

All employees and subcontractors are responsible for compliance with applicable Safety and Health regulations (e.g., 29 CFR 1926.550, 1926.554, etc.) in regards to the selection, operation and maintenance of cranes, derricks and hoists. This includes, but is not limited to:

1. Maintaining copies of annual inspection records and results at the job site at all times for regulated equipment.
2. Using personnel specifically trained and qualified for operating the equipment
3. Ensuring that the equipment used is capable of lifting the necessary weight(s).
4. Ensuring that equipment is turned off and locked out (i.e. brakes applied) when the equipment is unattended for any length of time.
5. Ensure that equipment is kept away from edges of trenches or excavations as required.
6. Ensure all required hazard signs and barricades are in place.

5.2.13 UNDERGROUND CONSTRUCTION AND UTILITIES

1. Definitions

- a. Caisson - generally vertical foundation unit below grade or a chamber placed in the ground or water for the purpose of excavating earth.
- b. Cofferdam - temporary structure for the control of water or other material during construction.
- c. Shaft - vertical or inclined opening excavated below ground level.
- d. Tunnel - generally horizontal excavation more than 14 inches in diameter, width or height and more than 6 feet in length below ground or water.
- e. Occupied tunnel - a tunnel entered by one or more people.

2. General Safety

- a. A safe means of egress and access shall be provided.
- b. Combustible debris shall be removed daily.
- c. When work is not being performed, the access shall be covered or otherwise blocked or restricted access.
- d. A sign in/sign out procedure must be in place to track all employees in and out of a tunnel.

- e. Prior to entering a tunnel, atmospheric testing shall be performed, and the results recorded. Testing shall be the responsibility of each employer for their employees. Earth Tech personnel shall not perform testing for other employers.
- f. Contractors shall comply with applicable Health and Safety regulations regarding underground construction (e.g., 29 CFR 1926 Subpart S, Underground Construction, Caissons, Cofferdams and Compressed Air, etc.).
- g. Personnel who enter tunnels, shafts or caissons shall wear hard hats at all times. If wet conditions exist, steel toed rubber boots shall be worn.

3. Training

Prior to entering tunnels, shafts or caissons, Earth Tech employees shall be trained in:

- a. Air monitoring.
- b. Ventilation.
- c. Illumination.
- d. Communications.
- e. Flood control.
- f. Mechanical equipment.
- g. Personal protective equipment.
- h. Explosives.
- i. Fire protection and prevention.
- j. Emergency plans, including evacuation and sign in/sign out procedures.

Various forms of underground utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, geophysical clearance is mandated, as well as obtaining authorization from all concerned public and base utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SSO and the HSM will be notified immediately. Work will be suspended until the appropriate actions for the particular situations can be taken.

5.2.14 MANUAL LIFTING

Most materials associated with investigation activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use at least two people to lift, or roll/lift with your arms as close to the body as possible. Under no circumstances should any one person lift more than 49 pounds unassisted.

5.2.15 HOT WORK

5.2.15.1 Welding/Cutting Operations

In the event that welding or torch cutting is required, the following procedures will be observed:

- Review SOP 20, Hot Work, prior to starting hot work activities.
- In accordance with 29 CFR 1910.252 paragraph (2)(iv), prior to the commencement of welding/cutting activities a "Hot Work" permit shall be completed as specified in accordance with Section 5.2.16.2 of this health and safety plan.

- All potential fire hazards within the vicinity of the work location (to a distance of 35 feet from the work location) shall be removed.
- If combustible/flammable materials cannot be removed a minimum distance of 35 feet from the location of the cut/weld, a person shall be designated for exclusive fire watch duty by the SSO to ensure that cuttings or slag do not ignite the materials in the surround area.
 - Each person assigned to fire watch duty shall have no other duties whenever welding operations are in progress.
 - The person assigned to fire watch duty will be equipped with a suitable fire extinguisher and trained in its proper use. In the event of a minor fire, the person assigned to the fire watch shall alert the welder, and attempt to extinguish the fire. The welder will cease operations and will assist the fire watch. If fire-fighting efforts are ineffective, they will sound an alarm or alert others in order to provide assistance or begin evacuation of the area and notify the base or local fire department.
 - The Contractor will be responsible for the safe handling of all welding/cutting equipment as well as the welding/cutting procedure.
- Subcontractor personnel, upon request, will be able to demonstrate to Earth Tech that they have been trained in the safe operation of their equipment and the process which they are performing.
- Personnel directly involved in the actual cutting procedure will be required to wear the minimum PPE as required by 29 CFR 1926.102.

5.2.15.2 Compressed Gas Safety For Welding/Cutting

In the event that compressed gases are used on site the following safety procedures will be observed.

5.2.15.3 Compressed Gas Cylinders

The following requirements will be observed when handling, casing, or storing compressed gas cylinders:

- Review SOP 29 before working with compressed gas cylinders.
- Compressed gas cylinders shall be equipped with connections complying with ANSI B57.1-1965, "Compressed Gas Cylinder Valve Outlet and Inlet Connections."
- Compressed gas cylinders will comply with applicable Department of Transportation requirements.
- Compressed gas cylinders shall be legibly marked for the purpose of identifying the gas content with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling and shall not be readily removable. The markings shall be located on the shoulder of the cylinder.

- Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame, intense radiant heat, electric arc, or high-temperature steam lines.
- Compressed gas cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet from highly combustible materials. Assigned storage spaces shall be located where passing or falling objects will not damage cylinders.
- Compressed gas cylinders shall be transported in a manner to prevent them from creating hazard by tipping, falling or rolling.
- All cylinders shall be equipped with valve protection devices when the cylinders are not in use or connected for use.
- Compressed gas cylinders in portable service shall be conveyed by suitable trucks to which they are securely fastened; and all gas cylinders in service shall be securely held in a rack or secured to rigid structures so they will not fall or be knocked over.
- Valve protection devices shall not be used for lifting cylinders. Cylinder valves shall be closed before moving cylinders.
- Cylinder valves shall be closed when work is finished.
- Cylinders shall never be used as rollers or supports whether full or empty.
- Cylinders will be inspected and maintained properly.

5.2.15.4 Pressure Regulators

Use of pressure regulators will be in accordance with the following:

- Regulators or automatic reducing valves shall be used only for the gas and at the pressure for which they are intended. Defective fuel gas pressure regulators shall not be used
- Gauges on oxygen regulators shall be marked "USE NO OIL."
- Before connecting a regulator to a cylinder valve, the valve shall be tested by being opened slightly and closed immediately. The valve shall be opened while standing to one side of the outlet; never in front of it.
- Before a regulator is removed from a cylinder, the cylinder valve shall be closed and the gas released from the regulator.

If cylinders are found to have leaky valves or fittings that cannot be stopped by closing the valve, the cylinder shall be taken outdoors away from ignition sources and slowly emptied.

5.2.15.5 Hot Work Permit

Prior to any welding, torch cutting, or brazing, a hot work permit shall be obtained in accordance with the following procedures.

1. The welder or work supervisor shall complete a "Hot Work" permit form (see SOP in Appendix A). The permit shall document the work operation(s) to be performed, the location of the work, and all safety procedures to be employed (e.g., fire watch).
2. The permit shall be approved by the CPM or SSO.
3. The permit shall be posted in the work area for the duration of all activities addressed by the permit.
4. At the completion of all work activities addressed by the permit, or at the end of the work shift, the permit shall be returned to the SSO or CPM for inclusion in the project files.

Each permit shall be valid for a period not to exceed a single working shift. If work will continue into a new shift, or will be resumed on the next working day, a new permit will be required, including approval by the SSO or CPM.

5.2.16 SITE CLEARING AND GRUBBING

During clearing and grubbing (vegetation removal) operations, personnel will be instructed in incorporating the proper methods of felling, limbing, and bucking logs. This includes such practices as looking for dead limbs before felling trees, making proper cuts to ensure trees fall in the area intended, positioning to avoid being exposed to falling or rolling trees, making sure that branches are not "spring loaded," and handling chain saws to prevent binding. Heavy equipment used for clearing and grubbing must be equipped with cabs to protect operators from falling or flying objects. The appropriate PPE, as specified in Section 6.0, must be worn in all clearing and grubbing operations. Personnel operating chain saws will wear full-length chaps, or equivalent, in addition to the standard safety apparel.

5.2.17 BIOLOGICAL HAZARDS

Exposure to bloodborne pathogens during the application of first-aid/CPR, as well as, contact with animals, insects, and plants can cause injury and illness to personnel. Care must be taken to ensure that these types of injuries are avoided.

Some examples of biological hazards include:

- The Earth Tech Bloodborne Pathogen Exposure Control Plan can be referenced in Appendix A immediately following the SOPs.
- Wild animals, such as snakes, raccoons, squirrels, and rats. These animals not only can bite and scratch, but can carry transmittable diseases (e.g., rabies). Avoid the animals whenever possible. If bitten, go to the nearest medical facility.
- Insects such as ticks, bees, and wasps. Ticks can transmit Lyme disease or Rocky Mountain Spotted Fever. Bees and wasps can sting by injecting a venom, which causes some individuals to experience anaphylactic shock (extreme allergic reaction). Whenever you will enter areas that provide a habitat for insects (e.g., grass areas, woods), wear light-colored clothing, long pants and shirt, and spray exposed skin areas with a DEET-containing repellent. Keep away from high grass wherever possible. Keep your eyes and ears open for bee and wasp nests. If bitten by insects, see a doctor if there is any question of an allergic reaction.

- Plants such as poison ivy and poison oak can cause severe rashes on exposed skin. Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with water.

5.2.18 RADIOLOGICAL HAZARDS

Although not anticipated during Construction Phase, drums or other types of containers within the Skinner Landfill have the potential to contain radioactive waste materials. Results from previous radioactive material surveys were not available for review. Due to this lack of data, radiation detection equipment will be used to screen soil at the discretion of the SSO. Background data/levels will be established at several local offsite locations prior to monitoring site conditions. All instruments used will be calibrated in accordance with the manufacturer recommendations or equivalent methods.

5.2.18.1 Direct Read Monitoring

Direct-read monitoring will be conducted at the site to determine presence of elevated radiation levels. The SSO will conduct radiation monitoring during site activities as necessary. When radiation levels are consistently above background levels, the SSO will notify the HSM and the CPM to determine if additional PPE or controls are required, and for any specialized packaging and/or disposal.

The monitoring action levels of one millirem per hour (mrem/hr) have been established for the Skinner Landfill site. If one mrem/hr is detected, the SSO and/or CPM will temporarily cease work activities in the potential source area and contact the HSM immediately for guidance with restricted/controlled area requirements along with any dosimetry program that may need to be implemented. However, radiation levels warranting a personal monitoring program is not anticipated. As a minimum, all site radiological hazard action levels will meet or be more stringent than applicable regulatory guidelines.

5.2.18.2 Radiological Hazardous Waste

All radiological waste accumulated at the site will be labeled and disposed of in accordance with 29 CFR 1910.1096 and applicable Department of Transportation (DOT) regulations.

5.2.19 LADDERS

This provides general work practices associated with ladders that may be used by Earth Tech personnel. Ladders shall be used and designed in accordance with SOP 27 and any applicable Federal, State and/or local regulations (e.g., 29 CFR 1926 Subpart X, Stairways and Ladders, etc.).

1. General Requirements

- a. A ladder shall be provided at all personnel points of access if there is a break in elevation of 19 inches or more and if a ramp, runway, sloped embankment, stairway or personnel hoist is not provided.
- b. A ladder shall be inspected before use, and after it has fallen or been involved in an accident.
- c. A ladder shall be immediately tagged "**DANGEROUS-DO NOT USE**" and taken out of service if any of the following defects are noted:

- 1) broken, worn or missing rungs, cleats or steps;
 - 2) broken or split side rails;
 - 3) broken or bent guides or iron spreaders; and/or
 - 4) broken or bent locks.
- d. Wood ladders shall be constructed and maintained as prescribed in the ANSI standard A14.1-1990.
 - e. Employees shall face the ladder when ascending and descending. Each employee shall use at least one hand when using a ladder. An employee shall not carry anything up and down ladders, which could cause him/her to lose their balance and fall.
 - f. Ladders shall be placed on a substantial or stable base.
 - g. A ladder shall not be used in a doorway, passageway, driveway or any other location where it can be displaced, unless it is guarded by barricades, or secured to prevent displacement.

2. Portable Ladders

- a. A portable ladder shall be used such that the pitch of the ladder is not more than $\frac{1}{4}$ of the vertical distance between the base and the top support.
- b. A portable ladder with a pitch less than $\frac{1}{5}$ of the vertical distance between the base and the top support shall have the top secured to prevent tipping.
- c. Portable ladders shall be equipped with safety feet, unless the ladder is tied, blocked or otherwise secured. Safety feet are not a substitute for proper securing of the ladder.
- d. A portable ladder used at a pitch of 80 degrees or more shall meet the requirements of a fixed ladder.
- e. A portable ladder, when used to access an upper landing surface, shall either:
 - 1) Extend three feet beyond the upper landing surface;
 - 2) or if it is not feasible to extend three feet beyond the upper landing surface, then the top of the ladder shall be secured, and a grabrail or equivalent shall be provided for employees use in mounting or dismounting the ladder.
- f. A manufactured portable metal ladder shall not be used for electrical work, or where an employee may contact electrical conductors. A ladder shall have nonconductive siderails for employee work around electrical equipment.
- g. A ladder shall not be used or moved unless a minimum of 20 feet is maintained between power transmission or distribution lines.
- h. A manufactured portable ladder shall not be used for more than the following lengths:
 - 1) Single section ladder.....30 feet
 - 2) Extension ladder.....60 feet
 - 3) Trestle ladder, or base/extension sections of a trestle ladder.....20 feet
- i. An employee shall not stand on the top two rungs or within three feet of the top of the ladder.
- j. Two portable ladders shall not be spliced together.
- k. Portable extension ladders shall only be adjusted from the ground or floor.
- l. A portable extension ladder shall be used so that the distance from the vertical surface to the ladder base is about $\frac{1}{4}$ of the ladder working length.
- m. Employees shall not use the backside of a stepladder for climbing.
- n. Unless equipped with a handrail, the top step and the cap of a stepladder shall not be used.

- o. A stepladder shall not be used as a straight ladder by leaning it against a vertical surface.
- p. Stepladders shall only be used when equipped with metal spreader or locking devices to hold the front and back sections in an open position. The ladder shall be opened fully and the spreaders locked when in use.

3. Training

- a. Each employee that uses a ladder shall receive training. This training shall enable each employee to recognize hazards associated with ladders, and the steps to minimize the hazards.
- b. The training shall address the following areas, as applicable:
 - 1) The nature of fall hazards in the work area.
 - 2) The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
 - 3) The proper construction, use and placement of, and care in handling, ladders.
 - 4) The maximum intended loads of the ladders.
 - 5) The provisions of the applicable OSHA regulations, and this Section.
- c. Retraining shall be provided as needed to ensure that employees maintain the knowledge needed to work safely with ladders.

5.2.20 IMPACTED MATERIAL SAMPLING AND REMOVAL

Personnel will be required to handle, characterize and remove contaminated soil or leachate from various site locations. Contaminated materials may be sampled, staged, categorized, treated and/or prepared for off-site disposal in accordance with the SOW. Dust minimization, site control and personal hygiene is key in reducing the potential for exposure to airborne contaminants. Decontamination of equipment/personnel will be performed in accordance with Section 9.0 of the health and safety plan.

5.2.21 WASTE CONTAINER HANDLING AND TESTING

Consolidation of any waste material found on-site will depend on several factors: The number of containers located at the site, the cost associated with consolidating the waste, and the compatibility of the waste materials with one another. Mixing any waste in an inherent risk due to the unknown chemical make-up of the waste material.

Any consolidating/mixing of waste found on-site shall not be performed unless approved by the Technical Committee Lead, the CPM, SSO, and/or site Chemist. Specific procedures shall be followed per instructions written or orally given to the site crew.

Excavation, handling, sampling, and field-testing of containerized waste material (drums or other containers) shall follow the procedures outlined in the site sampling plan and SOPs 39 and 40 (see HASP Appendix A).

5.3 GENERAL ENVIRONMENTAL CONTROLS

5.3.1 ILLUMINATION

Work areas will be provided with adequate levels of illumination at all times. A minimum lighting intensity of 10 foot-candles will be maintained where site personnel are required to perform gross-type activities.

Should site personnel suspect that the lighting intensity is inadequate, the SSO will ensure the area in question is evaluated. If lighting levels are evaluated and found to be inadequate, proper supplemental lighting equipment will be obtained in order to improve lighting conditions within the areas affected.

5.3.2 HOUSEKEEPING

During site activities, work areas will be continuously policed to remove excess trash and unnecessary debris. Such material will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Personnel observed throwing contaminated material or PPE away with municipal wastes will be removed from the site.

5.3.3 WATER SUPPLY

A water supply meeting the requirements of 29 CFR 1926.51 (a) will be used and consist of the following:

- **Potable Water:** An adequate supply of potable water will be available for personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources
- **Nonpotable Water:** Nonpotable water may be used for cleaning of equipment and fire fighting activities only. Nonpotable water will not be used for drinking or personal hygiene purposes.

5.3.4 TOILET FACILITIES

In accordance with 29 CFR 1926.51 a minimum of one toilet facility will be provided for each group of 20 employees or less. Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

5.3.5 WASHING FACILITIES

At each work location, employees will be provided washing facilities in accordance with 29 CFR 1926.51 (f). Every employee, upon leaving the work areas, should wash their hands with soap and water before proceeding to the break areas and at the end of daily work activities.

5.4 COMMUNICATIONS

Effective communication is essential to safe working conditions and the successful completion of the project. External communication will be maintained by personnel using cellular or land-line telephones or portable radios. The use of external communications may be needed during well installation, monitoring activities, excavation/trenching, and all other related activities to ensure communications with emergency response units (e.g., police, ambulance teams, fire department, etc.). Each work team will be equipped with an appropriate method of contacting either local or regional emergency services.

5.5 BUDDY SYSTEM

All site personnel shall use the buddy system. Workers shall be teamed with at least one additional worker or "buddy." Team members shall routinely maintain visual contact with each other and be alert for signs of illness or toxic exposure, such as:

1. Changes in complexion and skin discoloration.
2. Changes in coordination or demeanor.
3. Excessive salivation and/or papillary response.
4. Changes in speech pattern.
5. Headaches, dizziness, blurred vision.
6. Nausea or cramps.
7. Irritation of eyes, skin, or respiratory tract.

Anyone exhibiting symptoms should be taken immediately to the nearest medical facility or stabilized for transport by qualified medical personnel. If imminent danger exists, call the applicable emergency contact number listed in Section 7.0.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The harmful effects that chemical substances may have on the human body often necessitate the use of protective clothing. Proper selection of PPE depends on a number of factors. Protection against different types of chemicals and differing concentrations of those substances can be quite varied. The tasks to be performed and the probability of exposure to the substance must also be considered when specifying protective clothing. Once the specific hazard has been identified, appropriate clothing can be selected. The protection level assigned must match the hazard confronted. Protective clothing ensembles range from safety glasses, hard hats, and safety shoes to fully encapsulating suits with a supplied source of breathing air.

The purpose of personal protective clothing and equipment is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities. The level of protection required must correspond to the level of hazard known, or suspected, in the specific work area.

Level A provides the highest level of protection and Level D provides the lowest. See Table 6 for an outline of action levels, and see Tables 7 and 8 for specific PPE including glove materials, protective coveralls, and respirator cartridge type.

- Level D will consist of field clothes, outer gloves (if soil/water contact is likely), steel/composite toe and shank safety boots, safety glasses (for minor splash hazards), hard hat, and safety colored (orange or green) vests if working in the field around heavy equipment or vehicles.
- Modified Level D will consist of Tyvek® (or equivalent) coveralls, safety glasses, outer gloves with disposable inner gloves, steel/composite toe and shank work boots, overboots if free product is encountered or as otherwise specified, hearing protection, and a hard hat (see Tables 7 and 8 for specific PPE type and materials).
- Level C will consist of the same equipment as listed for modified Level D with the addition of a full-face, air-purifying respirator (APR). See Tables 7 and 8 for specific PPE type and materials.
- Level B is not anticipated for this project, however a description of specific PPE has been included as a precaution. Level B, if required for working on this project site, consists of the same equipment as listed for Level C with the substitution of a full-face, self-contained breathing apparatus (SCBA) in place of a full-face APR.
- Level A is not anticipated for this project.

When wearing modified Level D or Levels C, B, or A, all junctures between the chemical protective coverall (i.e., Tyvek suit), boots, and gloves must be taped. The suit must be placed over the boots and gloves. When taping, remember to leave a tab for easy removal. Stress spots in the suit must also be taped, such as under the arms, down the zipper, and up or across the back.

PPE has been selected consistent with the hazards associated with the expected field activities, and is available in various sizes to provide a good fit for all personnel. Site workers are responsible for maintenance and clean storage of equipment at the site.

6.1 HEAD PROTECTION

Employees will wear hard hats if the potential exists for exposure to flying or falling objects, or when working around heavy equipment. Hard hats are mandatory when working in areas where overhead hazards are present and to provide protection during operation of heavy equipment. Ear protection and

faceshields may be attached to hard hats. Hard hats purchased after July 5, 1994 shall comply with ANSI Z89.1, 1986. Head protection purchased prior to July 5, 1994 shall comply with ANSI Z89.1, 1969.

6.2 EYE PROTECTION

Eye protection will be worn at all times within work areas. Sunglasses may be permitted during activities performed outside as long as they meet the requirements of safety glasses. Wire-framed sunglasses used for eye protection will not be permitted at any time. Subcontractor employees who do not have suitable eye protection will have an appropriate type of eye protection provided to them by their respective employers.

Eye protection will meet the following minimum requirements:

- Provide adequate protection against the particular hazards for which they are designed.
- Be reasonably comfortable when worn under the designated conditions.
- Fit snugly and not unduly interfere with the wearer's movements.
- Be durable.
- Be easily cleaned and disinfected.
- Comply with ANSI Z87.1, 1989 (if purchased prior to July 5, 1994, comply with ANSI Z87.1, 1968).

Contact lenses do not provide adequate eye protection. Contact lens wearers must use the same additional eye protection as non-lens wearers. Contact lenses are generally not acceptable with respirators.

Persons whose vision requires correction and who must wear eye protection may wear goggles or spectacles of one of the following types:

- Spectacles whose protective lenses provide optical correction (R_x).
- Goggles that can be worn over corrective (R_x) spectacles without disturbing the adjustment of the spectacles.
- Goggles that incorporate corrective (R_x) lenses mounted behind the protective lenses.

6.3 HEARING PROTECTION

Appropriate hearing protection, including ear plugs, canal caps, and ear muffs, will be provided when noise may be a problem, such as around heavy machinery, power support equipment, and impact tools. When employees may be exposed to hazardous noise, a hearing conservation program will be implemented in accordance with 29 CFR 1910.95 (see SOP 42 in Appendix A).

6.4 FOOT PROTECTION

Employees will wear appropriate foot protection while working on site, which will consist of leather or water- and chemical-resistant boots with safety toes. Footwear (including leather work boots and chemical-resistant boots) must meet the specifications of ANSI Z41.1-1969 (if purchased after July 5, 1994, ANSI Z41, 1991), which is the standard for industrial footwear with safety toes. Protection against liquid hazardous chemicals requires boots of neoprene, polyvinyl chloride (PVC), butyl rubber, or other

material selected for resistance to the specific chemical. For tasks where contact with contaminated materials is expected to be slight or nonexistent, leather work boots with safety toes are appropriate.

6.5 HAND PROTECTION

Employees will use appropriate hand protection when exposed to hazards that could cause injury to the hands. Gloves must resist puncturing and tearing as well as provide any necessary chemical resistance.

Protective clothing will be worn over glove cuffs to prevent any liquid from spilling into the gloves. A pair of inner gloves adds an extra layer of protection for the hands during the removal of outer gloves and other chemically protective items and will be worn at all times when outer protective gloves are required. Where necessary, heavy leather gloves may be worn over chemical-protective gloves when doing heavy work. If they become contaminated, they will be discarded because leather is difficult to decontaminate.

6.6 RESPIRATORY PROTECTION

The routine use of respiratory protection is not currently anticipated for certain phases of this project. However, if respiratory protection is selected and used for worker comfort or is worn using the upgrade criteria specified in Section 6.0 of this HASP, the requirements outlined in SOP 13 (Appendix A) will be met.

Conservative hydrocarbon action levels are assigned for the Skinner Landfill field activities. Upgrade to Level C at or above one meter unit (or approximate ppm) and Level B at or above five ppm indicates a limited need for respirator filter change-out schedule in accordance with 29 CFR 1910.134. Since benzene and vinyl chloride are the hydrocarbons of greatest concern, Earth Tech has determined that monitoring with chemical-specific detector tubes will provide field personnel a means of quantitatively measuring the worker's breathing zone. If either material is detected and determined to be present above trace levels (about 0.5 ppm), the SSO and HSM will be contacted to evaluate potential PPE upgrade and site-specific respirator change-out schedules (See Table 6a of Attachment A). 29 CFR 1910.1028 (29 CFR 1926.1128), *Benzene*, and 29 CFR 1910.1017 (29 CFR 1926.1117), Vinyl Chloride, do not offer specific cartridge change-out requirements/schedule beyond *the expiration of their service life or the end of the shift*. Minimizing personnel exposure to the remaining contaminants will be accomplished by the existing action levels found in Table 6a in Attachment A.

6.6.1 BREATHING AIR QUALITY

Code of Federal Regulations 29 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the Compressed Gas Association Specification G7.-1966. Earth Tech requires a certificate of analysis from vendors of breathing air show that the air meets this standard. Personnel operating the booster pump used for filling air cylinders must receive a check-out prior to using this equipment.

6.7 BODY PROTECTION

Protective clothing and body protection is selected on the basis of the tasks to be performed and the hazards, both chemical and physical, to which the worker may be exposed. For all work areas, including the support and administrative areas, appropriate work clothing will be worn that at least covers from the knees to shoulders. Tank and halter-tops are not appropriate. Shorts and cut-off pants are not appropriate.

In more hazardous work areas, substantial pants and long sleeves are appropriate. Chemical-protective body protection may be selected using predicted chemical exposures and the clothing manufacturer's chemical-specific permeation and degradation information to provide optimum protection.

6.8 HEALTH AND SAFETY ACTION LEVELS

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone.

If ambient levels are measured which exceed the action levels in areas accessible to the public or unprotected personnel, necessary site control measures (barricades, warning signs, and mitigative actions, etc.) must be implemented prior to commencing activities at the specific work site.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of CPM and SSO.

REASONS TO UPGRADE:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas, vapor, or dust emission.
- Change in work task that will increase the exposure or potential exposure to hazardous materials.

REASONS TO DOWNGRADE:

- New information indicating that the situation is less hazardous than was originally suspected.
- Change in site conditions that decreases the potential hazard.
- Change in work task that will reduce exposure to hazardous materials.

Table 6: Action Levels During Environmental Services (see HASP Table 1 for equipment)

| PARAMETER | LOCATION AND INTERVAL | RESPONSE LEVEL (Meter units/ppm above background) | RESPONSE |
|---|---|---|--|
| Hydrocarbons (Total by PID, see "RESPONSE" for benzene and vinyl chloride monitoring using detector tubes when meter units are 1-5) | Prior to initial entry in to impacted areas and then at least every 30 minutes afterwards in the worker's breathing zone or in the immediate work area. Confined spaces may require continuous monitoring. | < 1 | Continue Level D or Modified Level D work and continue monitoring. |
| | | ≥ 1 (If no detector tubes drawn) | If no detector tubes are drawn, upgrade to Level C PPE (GMC/P100 cartridges or equivalent chemical cartridge combined with P100). Monitor for benzene, vinyl chloride and continue monitoring. |
| | | PID ≥ 1 - 5 and; benzene < 0.5 ppm vinyl chloride < 0.5 ppm | Periodically monitor for benzene and vinyl chloride with detector tubes. Contact the SSO or HSM, implement mitigation measures, and continue work in Level D. See benzene and vinyl chloride specific monitoring information below and continue monitoring. |
| | | > 5 - < 10 | Upgrade to Level C PPE (GMC/P100 cartridges or equivalent chemical cartridge combined with P100). Continue environmental monitoring. |
| | | > 10 | Cease work, exit the area, contact the SSO or HSM and upgrade to Level B. |
| Hydrocarbons (Total by PID)* | Perimeter of exclusion zones, at least every 30 minutes during intrusive activities involving impacted materials. | < 1 | Continue work and continue monitoring. |
| | | ≥ 1 (Sustained for more than 5 minutes) | Implement mitigation measures, contact the SSO and maintain levels < 1 ppm |
| Work Area Benzene Detector tubes (e.g., Drager 6728561, Benzene 0.5/a or equivalent) | Breathing zone, every 30 minutes where indicted by PID readings (see PID response levels above). | ≥ 0.5 - < 10 ppm | Cease work, exit the area, contact the SSO/HSM and upgrade to Level C PPE (GMC/P100 cartridges or equivalent chemical cartridge combined with P100). Continue to monitor for benzene. |
| | | ≥ 10 ppm | Cease work, exit the area, contact the SSO/HSM and upgrade to Level B. |
| Work Area Vinyl Chloride Detector tubes (e.g., Drager 6728061, vinyl chloride 0.5/a or equivalent) | Breathing zone, every 30 minutes where indicted by PID readings (see PID response levels above). | ≥ 0.5 - < 10 ppm | Cease work, exit the area, contact the SSO/HSM and upgrade to Level C PPE (GMC/P100 cartridges or equivalent chemical cartridge combined with P100). Continue to monitor for vinyl chloride. |
| | | ≥ 10 ppm | Cease work, exit the area, contact the SSO/HSM and upgrade to Level B. |
| Dust, Mist, Aerosols (Total by Mini-Ram)* | At least every 30 minutes in the worker's breathing zone during intrusive activities involving impacted materials. In addition, site perimeter monitoring may be initiated by the SSO based on elevated air monitoring results. | Initial excavation or disturbance of unknown materials | Level C ensemble as listed in Table 7 and per SSO and HSM. |
| | | <1 mg/m ³ (Sustained for more than 5 minutes) | Continue Level D work and continue monitoring. |
| | | ≥1 mg/m ³ (Sustained for more than 5 minutes) | Upgrade to Level C PPE. Contact the CPM and SSO, implement mitigation measures, and continue Level C (GMC/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring. |
| | | ≥5 mg/m ³ (Sustained for more than 5 minutes) | Temporarily cease work operations, contact the CPM and HSM to discuss improving site mitigation measures. Possible upgrade to Level B for exclusion zone workers. |

Table 6 (continued): Action Levels During Environmental Services

| | | | |
|--|--|---|---|
| Oxygen Levels (multi-gas detector or O ₂ meter) | In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials. | 19.5 – 23.5 percent (%) O ₂ | Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors. |
| | | < 19.5 or > 23.5 percent (%) O ₂ | Cease work, exit the work area or confined space and contact the SSO. |
| Carbon Monoxide | In the breathing zone/work area prior to and during entry in to container/drum, impacted work area or confined space. | < 25 ppm | Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors. |
| | | > 25 ppm | Cease work, exit the work area or confined space and contact the SSO. |
| Explosive Atmospheres (multi-gas detector or CGI) | In the breathing zone/work area prior to and during entry in to container/drum, impacted work area or confined space. | < 10% LEL | Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors. |
| | | ≥ 10% LEL | Cease work, exit the area or confined space, and contact the SSO. |
| Radioactive Materials (radiation meter) | Prior to entry (at perimeter) and during work operations in potentially/confirmed radioactive material areas. | < 1 mrem/hour | Continue work and continue monitoring. |
| | | ≥ 1 mrem/hour | Temporarily cease work operations and discuss controls with SSO and HSM. |
| Hydrogen Sulfide (multi-gas detector or individual H ₂ S meter) | In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials. | < 10 ppm | Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors. |
| | | ≥ 10 ppm | Cease work, exit the area or confined space, and contact the SSO. |

• or equivalent method approved by the SSO and HSM
LEL Lower explosive limit
PID Photoionization detector

CGI Combustible gas indicator
O₂ Oxygen
ppm parts per million

Table 7: Operation-Specific PPE Guidelines

| OPERATION | MINIMUM PPE |
|---|--|
| Initial Site Mobilization and Preparation | <p><u>Routine Activities: Level D</u></p> <p>No impacted material disturbance or handling:</p> <ul style="list-style-type: none"> • Typical work uniform (no tank tops or shorts) • Safety glasses with side-shields • Safety toe/shank boots • Hearing protection • Hard hat • Hand protection • Safety colored vest (to be worn by ground personnel working near heavy equipment or rail operations) • Other. |
| <p>Delineate and set-up work zones</p> <p>Interceptor system installation activities</p> <p>Installation of groundwater monitoring and extraction wells, piezometers and gas probes</p> <p>Earth moving, excavation of soils and landfill placement of site materials</p> <p>Perform soil, water, groundwater, and/or waste sampling, field testing, consolidation, and packaging</p> <p>Landfill Cap installation</p> <p>If necessary, identify, collect, overpack, and stage drums, containers and waste/impacted materials</p> <p>If necessary, arrange for the transportation and disposal of drums and containers</p> <p>Perform site restoration</p> <p>Survey activities</p> <p>Decontamination</p> <p>Site demobilization</p> | <p><u>Routine Activities: Level D</u></p> <p>No impacted material disturbance or handling:</p> <ul style="list-style-type: none"> • Typical work uniform (no tank tops or shorts) • Safety glasses with side-shields • Safety toe/shank boots • Hearing protection • Hard hat • Hand protection • Safety colored vest (to be worn by ground personnel working near heavy equipment operations) • Other. <p><u>Upgrade: Modified Level D</u></p> <p>If site tasks require handling or contact with impacted materials requiring increased body protection:</p> <ul style="list-style-type: none"> • Same as Level D above with the following additions; • Body protection (see Table 8) • Chemical resistant hand protection. <p><u>Upgrade: Level C</u></p> <p>If airborne contaminants are present requiring the use of respiratory protection:</p> <ul style="list-style-type: none"> • Same as Modified Level D above with the following additions; • Full-face respirator equipped with GMC/P100 cartridges or equivalent chemical cartridge combined with P100. <p><u>Upgrade: Level B</u></p> <p>If elevated airborne contaminants are unknown, present or anticipated (initial opening of drums/containers, confined space entry or similar operations) conditions requiring the use of respiratory protection:</p> <ul style="list-style-type: none"> • Same as Level C above with the following additions; <p>Full-face Self-Contained Breathing Apparatus (SCBA) or supplied air system with escape capabilities in place of a full-faced air purifying respirator. If Level B is determined to be required by the SSO (i.e., elevated VOCs, confined space entry or change in site conditions), the SSO will contact the HSM prior to any Level B work shift.</p> |

Table 8: Hazard Analyses for PPE

| POTENTIAL HAZARDS | DISCUSSION | PERSONAL PROTECTIVE EQUIPMENT |
|---|--|---|
| OVERHEAD HAZARDS | There may overhead work being performed, flying debris or areas where overhead equipment is a problem (e.g., hoisting/rigging, drilling, material excavation). | Hard hat (not required in enclosed equipment cabs). Keep hard hat in cab and wear when dismounting equipment. |
| EYE/FACE <ul style="list-style-type: none"> Particulate/flying objects | Areas where personnel are working have the potential of either having a mist occur, or the work generates particulates. | Safety glasses with side-shields. |
| <ul style="list-style-type: none"> Chemical toxicity | When handling contaminated material when a splash hazard exists. | Chemical splash goggles or faceshield. |
| <ul style="list-style-type: none"> Physical hazard | NA | NA |
| INHALATION | Vapors, mists and dusts may be generated during site operations (see Table 6 and 7). | Ensure the use of a PID, in accordance with Table 6 during these operations. Wear respirators (as annotated in Table 6 and 7) when upgrade to Level C is needed. Minimize visible emissions by using dust suppression methods (water). |
| HAND <ul style="list-style-type: none"> Chemical hazards | Possible contamination whenever contaminated material is being handled, or when sampling or working with contaminated wastewater or soil. | Inner and outer nitrile gloves (or equivalent) with duct tape at interfaces when working with impacted materials. When the potential exists for contact with PCB-impacted materials, workers shall wear Viton® outer gloves and nitrile inners. Latex gloves are not recommended. |
| <ul style="list-style-type: none"> Physical hazards | If Earth Tech employees perform manual labor, potential exists for cuts/abrasions, blisters, etc. In addition, working outside in cold weather. | Wear gloves (i.e., leather, cotton) when clearing and grubbing, shoveling material or snow, etc. Wear insulated gloves when working outside in cold weather to prevent cold stress. |
| <ul style="list-style-type: none"> Biological hazards | No medical debris expected. If working in an area where poison ivy, oak or sumac are possible, gloves may be needed. Bloodborne pathogens during first aid treatment. | Wear cotton gloves when working in areas where poison ivy, etc. may be present. Don protective gloves while providing first aid treatment. |
| FOOT <ul style="list-style-type: none"> Chemical hazards | When handling contaminated materials, performing decon activities or during leaks/spills clean up. | Wear chemical resistant safety boots. |
| <ul style="list-style-type: none"> Physical hazards | Primarily from falling objects, equipment or other physical contact. Various jobs have the potential for presenting foot hazards. Also, outdoor work in cold weather presents a problem. | Steel toe/shank boots. During outdoor winter activities, ensure insulated foot coverings are worn to prevent cold stress. |

Table 8: Hazard Analyses for PPE (Continued)

| POTENTIAL HAZARDS | DISCUSSION | PERSONAL PROTECTIVE EQUIPMENT |
|--|---|---|
| Whole body <ul style="list-style-type: none"> Chemical hazards | Potential contact with impacted materials exists (solids and/or liquids) during removal, handling or hauling operations or change in site conditions. Also, possible splashing during decontamination processes or while cleaning up chemical spills. | Wear coated Tyvek® (e.g., poly-coated, Saranex™ as appropriate, etc.) if splash hazard exists. Regular Tyvek® or other protective coverall if task presents no potential for splash or contact with impacted materials. Note: Workers shall use Saranex™ suits (or equivalent coating and protected seams) when the potential exists for contact with PCBs. |
| <ul style="list-style-type: none"> Physical hazards | Site heavy equipment or vehicles, Working on tanks or from ladders, clearing/grubbing, confined spaces entry. | Implement fall protection standards to minimize fall hazards. When necessary, non-entry rescue/retrieval equipment shall be available or implemented. Safety colored vest (safety orange or green). Use flag person/spotter as required. Wear leg chaps while clearing and grubbing with chain saws or similar equipment. |
| <ul style="list-style-type: none"> Biological hazards | Possible exposure to biological hazards such as poison oak, ivy, sumac, and insects (ticks, bees) and animals. | Wear long pants, and, in areas with likely tick infestation, ensure the use of DEET containing spray, and light colors around the feet/calves area. Do not approach areas where bees have nests, until the proper actions have been taken to remove the nest. |
| <ul style="list-style-type: none"> Ear protection | Use of noise producing heavy, hauling and support equipment. Also, possibility of cold hazards during the winter months. | Wear hearing protection as required. Wear earmuffs, or other insulated ear protection, when working in cold conditions. |

7.0 EMERGENCY RESPONSE PLAN

7.1 INTRODUCTION

The purpose of this Emergency Response Plan is to outline the necessary response during times of emergency; to minimize hazards to human health; and protect against fire, explosion, flood, and chemical release to soil and air. Effective emergency planning requires coordination and forethought by operating staff. Constant vigilance and awareness of potential hazards and a continuing effort to eliminate or control them are prime requisites to accident prevention. Emergencies sometimes develop, however. An important part of any safety program is preparation for any emergency so proper action may be taken.

This Emergency Response Plan and SOP 34, Emergency Response (see Appendix A) are meant to serve as guides to identify the major considerations in an emergency.

7.2 WHAT IS AN EMERGENCY?

An emergency is any situation (on or off the Skinner Landfill site) that immediately threatens human life, health, the environment, or damage to facilities. The ultimate determination of an emergency situation is left to the discretion of each individual.

Many emergencies potentially include a combination of two or more types of situations. Emergencies that might arise at this facility probably fall within the following categories:

- Explosions
- Hazardous Materials Emergency (Toxic Chemicals, Laboratory Spills)
- Leaking Pipelines, Tanks, Vessels
- Fires
- Power Interruption
- Medical Emergencies
- Safety Equipment Problems

To ensure that facility operations go on with minimum disruption of service, emergencies must be anticipated so plans using alternate methods of operation, emergency repair, first aid, or other emergency response procedures may be put into action. OSHA (and state-sponsored health and safety agencies) require this written Emergency Response Plan along with specific information and training for employees to be available at this project site.

7.3 IMPLEMENTATION OF EMERGENCY PLAN

It is necessary for an Emergency Response Plan to be at each individual project location. The desire to protect staff members as well as off-site neighbors drives the development and planning of these specific procedures and practices designed to provide rapid, accurate, practical, and safe responses to emergency situations on this project site.

The decision to implement the Emergency Response Plan depends on whether an impending incident could threaten human health or the environment. If an emergency situation arises, decide on the course of action, and then carry out the plans in a safe, orderly, and controlled manner. Do not panic—remain

calm and deal with the incident in a logical and methodical fashion. If the procedure required to correct an emergency situation is too extensive or unsafe to be handled by the personnel on hand, additional personnel must be contacted. **DO NOT ATTEMPT RESOLUTION OF AN EMERGENCY IF A LOGICAL COURSE OF ACTION IS NOT READILY APPARENT—GET HELP!!**

Any person discovering an emergency situation should contact the proper agencies (e.g., Police Department, Fire Department) and the Primary Emergency Coordinator or the Alternate if the Primary Coordinator is unavailable or cannot be reached. The Primary and Alternate Coordinators have complete authority to commit all of Earth Tech resources in the event of an emergency. The Emergency Coordinator will determine which organizations must be contacted based on the nature of the emergency. Table 9 in Section 7.4 below provides the list of the emergency contacts, and the necessary phone and/or pager numbers. Figures 3 and 4 depict the routes to the nearest hospital from the Skinner Landfill site.

7.4 EMERGENCY COORDINATOR AND STAFF

Employers recognize the need to be prepared in the event of an emergency so that damage to human health and to the environment can be avoided or minimized. A key figure in implementing a response plan is the Emergency Coordinator. His or her specific responsibilities and duties during and after the emergency incident are described in the following section. However, the emphasis on prevention and immediate response to hazardous conditions requires that the Coordinator be free to use professional judgment in emergency situations. Frequent inspection and active participation in this project on a daily basis by the Primary and Secondary Coordinator minimizes the chance of a major accident.

It is the Emergency Coordinator's responsibility to manage emergency situations with all available assets instead of merely providing a response to a crisis. Emergency management applies good planning, definition of roles and authority, and direction of a trained and motivated staff to control the situation and resolve it quickly and efficiently. A list of the names and numbers for the various emergency coordinators and contacts are listed in Table 9 of this section.

In most cases, reducing the pressure source by either closing/opening a valve, shutting down a pump, or shutting off an ignition source will deter an explosion.

An explosion may also create hazards subsequent to itself, such as fire or toxic vapor release. Without endangering personnel, make a quick assessment of the situation. Call the emergency service agency (e.g., Fire Department) immediately and, if there are injuries, ask for medical assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

You shall send someone to meet the responders outside the area to direct them to the scene and familiarize them with the conditions there (e.g., electrical, vapors, chemicals).

Any time the Emergency Response Plan is implemented, a detailed report of the entire incident will be recorded. Careful documentation during and after an emergency will be needed for insurance issues, legal issues, accident investigations and analysis to prevent re-occurrence. Good record keeping and a critique of an incident after the fact can provide an excellent method of preventing another incident. All records will be maintained in project files.

7.5 EMERGENCY CONDITION/RESPONSE

The purpose of this section is to provide guidance to the Emergency Coordinator and staff in making emergency decisions. The following sections discuss a number of possible emergency situations, which could occur at this site. Remember that many emergencies may include a combination of two or more types of situations at the same time.

In the event of any emergency incident:

- Work activities will cease and all project personnel will be evacuated from the work location. The evacuation will proceed in a direction opposite the critically affected area, with all personnel assembling in a pre-designated location outside of the job site proper.
- A headcount will be taken of the assembled employees and any injured individuals shall be administered first aid.
- If not present at the work location, the SSO, Emergency Coordinator and CPM will be contacted immediately.
- Take appropriate corrective actions prior to continuation of work following an incident.

A universal signal for emergency evacuation (e.g., use of a horn), and designation of the evacuation assembly location, shall be established by the SSO and Emergency Coordinator and briefed to all workers during initial site-specific training. The SSO will test the selected signal equipment (horn, siren) to evaluate the emergency evacuation program. Results of response times, participation of assembly and overall effectiveness will be documented on site-specific forms and/or in the EHS Log book. Any changes mandated by changing site conditions shall be determined by the Emergency Coordinator and communicated to workers during the tailgate safety briefing.

The following list will be expanded if additional emergency situations are confronted.

- Explosions
- Hazardous Materials Emergency (Toxic Chemicals, Laboratory Spills)
- Leaking Pipelines, Tanks, Vessels
- Fires
- Power Interruption
- Medical Emergencies
- Safety Equipment Problems

7.5.1 EXPLOSION

The possibility of an explosion may exist at this project site. Some explosion risks include:

- Flammable containers (contents of many of the containers have flash points at room temperature).
- Explosive gases collected in low areas (manholes, etc.)
- High/Low pressure air lines
- Pressurized water lines
- Electrical receivers

7.5.2 HAZARDOUS MATERIAL RELEASE

The most common hazardous materials at this project are:

- Fuels/oil
- Laboratory/field chemicals
- Cleaning solutions, acids/bases
- Impacted materials release

The appropriate emergency response to a hazardous materials incident will be dictated by the MSDS (see Appendix D).

To deter or minimize a release of a hazardous material, a person may close a valve or flick a switch as they are leaving the affected area. *Do not attempt to re-enter the affected area without proper equipment, training, and assistance.*

Special response equipment and PPE are needed when responding to hazardous materials incidents.

Without endangering personnel, make a quick assessment of the situation. Call the emergency services agency (Fire Department, etc.) immediately and, if there are injuries, ask for medical assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

You shall send someone to meet the responders outside the area to direct them to the scene and provide information about the conditions that may exist, including appropriate MSDS of hazardous material. The Fire Department has spill containment dikes, absorbents, neutralizing chemicals and other forms of attack for spills or leaks.

Site personnel who are trained and HAZWOPER-certified (see Appendix B) are available to assist the Fire Department and Emergency Coordinators in addressing the incident.

7.5.2.1 Material Release Response

In the event of a spill or release of hazardous materials brought on site or during the transportation of site materials, the owner and/or carrier of the material is responsible for appropriate notification, remedial and disposal activities. Clean-up operations must return the impacted area or equipment back to pre-release condition.

If a spill or release occurs on site or at a nearby off-site location (requiring limited travel) involving removed or treated site materials, site personnel will provide support to mitigate any further release of the material and clean up the results of the release as requested by the CPM.

7.5.3 LEAKING PIPELINES, TANKS, VESSELS

Ruptures and stoppages in piping systems are always possible. At this project, ruptures are most frequent in pressurized lines (water, air, etc.).

In either case, the first action must be to relieve pressure and isolate the pipe. This may be done by stopping and locking out pumps, and closing valves (to isolate) or opening valves (to relieve pressure.) Bypass the problem to maintain operation if possible.

Emergency procedures after a rupture or stoppage may create other hazards subsequent to the initial incident, such as flooding, and/or may endanger the public. If removal of an underground storage tank is required, reference SOP 23 in Appendix A prior to the commencement of removal activities.

Without endangering personnel, make a quick assessment of the situation. Call the emergency services agency (e.g., Police Department and Fire Department) immediately and, if there are injuries, ask for medical assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

You shall send someone to meet the responders outside the area to direct them to the scene and familiarize them with the situation.

When excavation is required for repairs, contact a utility locator service (i.e., The Ohio Utility Protection Service (OUPS) at (800) 543-5599) and the CPM before digging (See Table 9, Page 7-11 for details). If the excavation is near a public thoroughway, acquire proper signage and traffic control devices.

To clear a stoppage, after relieving pressure, remove the material causing the stoppage. At this project, this material could be anything. In some cases, the stoppage can be removed by flushing with high pressure water. Remember to keep valves open if flushing is attempted. In other cases, the piping must be dismantled and the foreign material removed by hand (see SOP 19, Line Entry). The choice of method is left to the operator.

Follow a few general principles in removing stoppages:

- Personnel must know the piping system and conveyed materials they are working on. They must be familiar with the valves and their functions in the system, bypasses, pumps, and, most of all, the purpose of the system.
- Never work on any pressure system until the source of the pressure is removed by closing the proper valves or turning off the proper pump or compressor. Don't start work until the system valves and pumps or compressors are locked and tagged or in the closed-off position, and the system pressure has been bled off as necessary.
- When removing material from a line, always wear proper PPE, including gloves to protect hands from anything imbedded in the material, and safety glasses and goggles to protect from splashes.

7.5.4 SEVERE WEATHER

Severe weather includes tornadoes, lightning, and flooding. Some of these conditions, such as tornadoes, can come upon the work site suddenly, with little to no warning. The following actions shall be implemented for each situation:

- Tornadoes - Radio stations will provide updates when conditions are right for tornado formation. The Emergency Coordinator will listen to the continual updates, and if conditions worsen, personnel will either be sent to their homes (if time and conditions allow), or to pre-designated

shelters. In the event of being outside when a tornado forms, personnel shall evacuate all equipment and lay flat in the nearest low point in the ground (unless time permits evacuation to the designated shelter).

- Lightning - In the event of lightning, all construction equipment shall be shut off, and personnel shall enter the nearest structure. **UNDER no circumstances stand under a solitary tree.** If a structure is not nearby, either remain in an enclosed vehicle, or lay flat at a low point on the ground.
- Flooding - When flooding is expected, take all equipment to the highest ground level possible. Then workers shall proceed to the highest available point (e.g., multi-story building).

7.5.5 FIRES

The possibility of a fire may exist in a number of areas around the work sites at this project. Fires are most frequently in electrical devices, in storage areas, and in work areas. A fire may also create hazards subsequent to the fire itself, such as an explosion or toxic vapor release.

Without endangering personnel, make a quick assessment of the situation. Call the emergency services agency (Fire Department). If there are injuries, ask for medical assistance. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name. Someone shall be sent to meet the responders outside the area to direct them to the scene and familiarize them with the existing conditions.

If the fire is small, try to extinguish it only after help is on the way. It is better to have the fire out when the Fire Department arrives than to discover too late that you cannot control the fire and should have called for help. Pre-planning and training is necessary before performing this task—if you have not been trained in the proper usage of fire extinguishers, do not attempt to control the fire. Leave the area immediately. **EXCEPTION: NEVER TRY TO FIGHT A FIRE IN A HAZARDOUS MATERIALS STORAGE AREA.**

If you cannot extinguish the fire, follow these general procedures (if it is safe to do so) to prevent further spread of the fire, and minimize damage to personal health and/or the facilities.

1. Never endanger your own life.
2. Remove any combustible material from the vicinity of the fire.
3. Shut down gas supply lines to the area.
4. If it is an electrical fire, cut the power to the affected area by pulling the appropriate circuit breaker.
5. Hose down nearby structures (only after shutting down all utilities to the structures.)
6. Remove any equipment that can be safely moved from the area.
7. Close doors, windows, and vents.
8. Be aware of chemicals located in the affected area such as welding equipment, propane, and hazardous materials.
9. Make appropriate MSDSs available to fire fighters before entry
10. Keep all personnel away from affected area.

Fire extinguishers are primarily first response instruments, intended for use on fires in their beginning stages before they get a chance to spread. Portable fire extinguishers have specific regulations developed

governing their type and use. Particular attention must be given to selecting the proper type of fire extinguisher for the particular type of fire. The following list shows various types of fire extinguishers, listed in order of preference, typically used with each class of fire.

- Class A for use on materials such as wood, cloth, paper, and rubber
- Class B for use on flammable liquids, gases, and greases
- Class C for use on energized electrical fires (Class A and B extinguishers may be used effectively on de-energized electrical fires)
- Class D for use on combustible metals such as magnesium, titanium, zirconium, sodium, and potassium

NEVER USE A SOLID STREAM OF WATER ON ELECTRICAL FIRES. WATER IS AN EXCELLENT CONDUCTOR OF ELECTRICITY AND ITS USE MAY RESULT IN ELECTRICAL SHOCK.

Remember, if evacuation from a burning facility becomes necessary, ***Move Quickly*** to the nearest exit, ***Keep Calm*** and ***Stay Low***. The temperature difference between the air at the floor level and eye level can be considerable. Try not to inhale smoke; if necessary, breathe through a damp cloth. ***If your clothing catches fire "DO NOT RUN" and "STOP, DROP, AND ROLL"*** Running simply fans the flames and intensifies the fire. If there is a rug, coat, or blanket available, roll in it. Rolling will smother the flames. Once out of the affected area, proceed to an out-of-danger area and when possible, assemble in groups. This prevents interference with fire fighters and at the same time gives the opportunity to account for personnel and to issue further instructions. If you cannot account for everyone and suspect they may still be inside the facility, notify the Fire Department. They give first priority to the preservation of life.

Do Not Reenter the Building for any reason. Clothing, valuables, or other items that were left inside are not worth your life.

7.5.6 POWER INTERRUPTIONS

Interruptions in power may become emergency situations. Almost all of the equipment used to operate and maintain the project uses electricity.

Power interruptions are emergencies when the potential for damage to human health or the environment exists. Usually during power interruptions, other hazards are present (such as severe weather, etc.).

The person responding to a power interruption should assess the situation, and then contact an emergency coordinator if the potential for an emergency situation exists. Contact the utility company (i.e., CG&E at (800) 534-5599) and the client to notify them of the power failure and potential emergency. When calling in the emergency, give location, describe the nature of the emergency, provide your name, and ask when the power is expected to be restored.

If the power interruption is not caused by the power company, an electrician should be called to determine the cause and make corrections.

Remember, work safely in emergency situations!!

7.6 MEDICAL EMERGENCIES

Medical emergencies can be described as situations that present a significant threat to the health of personnel. These can result from chemical exposures, physical injury, heat stress, cold stress, and poisonous insect or snake bites. Medical emergencies must be dealt with immediately and proper care should be administered. This may be in the form of first aid and emergency hospitalization.

In the event of a medical emergency:

- All injured individuals who require it will be given appropriate emergency first aid by a qualified individual trained in first aid.
- Call 911 for initial EMS response and transportation of severely injured personnel to a hospital.

7.7 SAFETY EQUIPMENT PROBLEMS

An emergency may develop due to malfunction or other problems associated with health and safety equipment being used by field personnel. These equipment problems must be corrected before proceeding with field activities. Health and safety problems that may occur include:

- Leaks or tears in protective clothing.
- Failure of respiratory protective devices (e.g., APRs).
- Encountering contaminants for which prescribed PPE may not be suitable.

7.8 EMERGENCY/SAFETY EQUIPMENT

7.8.1 LIST OF EQUIPMENT

The following equipment will be available in the field trailer or site vehicles:

- Oxygen and gas detector
- Cartridge-type respirators
- Tyvek suits
- Portable radios
- Cleaner-sanitizer for personal safety equipment
- Explosion-proof, 3-cell flashlights with batteries
- Eye and face protection
- Fire extinguishers
- First aid kits
- Hard hats
- Hearing protection devices
- Hand protection (gloves)

7.8.2 FIRST AID KITS

Each work site shall have a first-aid kit meeting the following requirements:

- First-aid kits in weather-proof containers will be assembled, provided, and maintained in accordance with ANSI and shall be present at all locations where employees will be working.
- First-aid kits shall be available at the job site at all times.
- First-aid kits shall be inspected and restocked weekly. An inventory of first-aid supplies sufficient to restock kits on a weekly basis shall be maintained.
- Personnel permitted to use first-aid kits shall possess a current first-aid/CPR card.

7.8.3 EYEWASH UNITS

Eyewash units meeting the requirements of ANSI Standard Z358.1-1990 will be used at the site and shall be strategically located for use by personnel in multi-work areas. Eyewashes shall be capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4-gallon per minute.

7.8.4 FIRE EXTINGUISHER

As a minimum, fire extinguishers capable of extinguishing Class A, B, and C fires will be available for use at the site at all times. Fire extinguishers staged and/or used at the site will meet or exceed the ratings specified by OSHA in 29 CFR 1926 and will be used by employees trained in the safe operation and use of portable fire extinguishers. Site personnel will be readily aware of the location of the fire extinguisher at all times in the event of an incident where a fire extinguisher may be used.

Table: 9 Emergency Contacts

EMERGENCY COORDINATORS

| Names | Title/Workstation | Phone | Pager |
|-----------------------|--|---|----------------|
| Rick Warwick | Earth Tech – Construction Project Manager | (606) 442-2300 (606) 802-1708 (mobile) | (877) 831-1148 |
| Skinner Landfill Site | Trailer | To Be Determined | |

EARTH TECH OFFICIALS

| | | | |
|-----------------|-------------------------------|--|----------------|
| Chris Moses | Responsible Corporate Officer | (606) 442-2300 (Wilder, KY) (804) 515-8334 (Richmond, VA) | (877) 831-4078 |
| Dale Prokopchak | Health and Safety Director | (804) 515-8556 | (877) 830-1981 |
| Jeff Grant | Health and Safety Manager | (800) 688-9828 (616) 225-8087 (home) (734) 516-5232 (mobile) | |
| Ron Partilla | Health and Safety | (800) 688-9828 (616) 249-3844 (home) (734) 516-5234 (mobile) | |
| Marty Lalick | Health and Safety | (800) 688-9828 (616) 249-0150 (home) (734) 502-0121 (mobile) | |

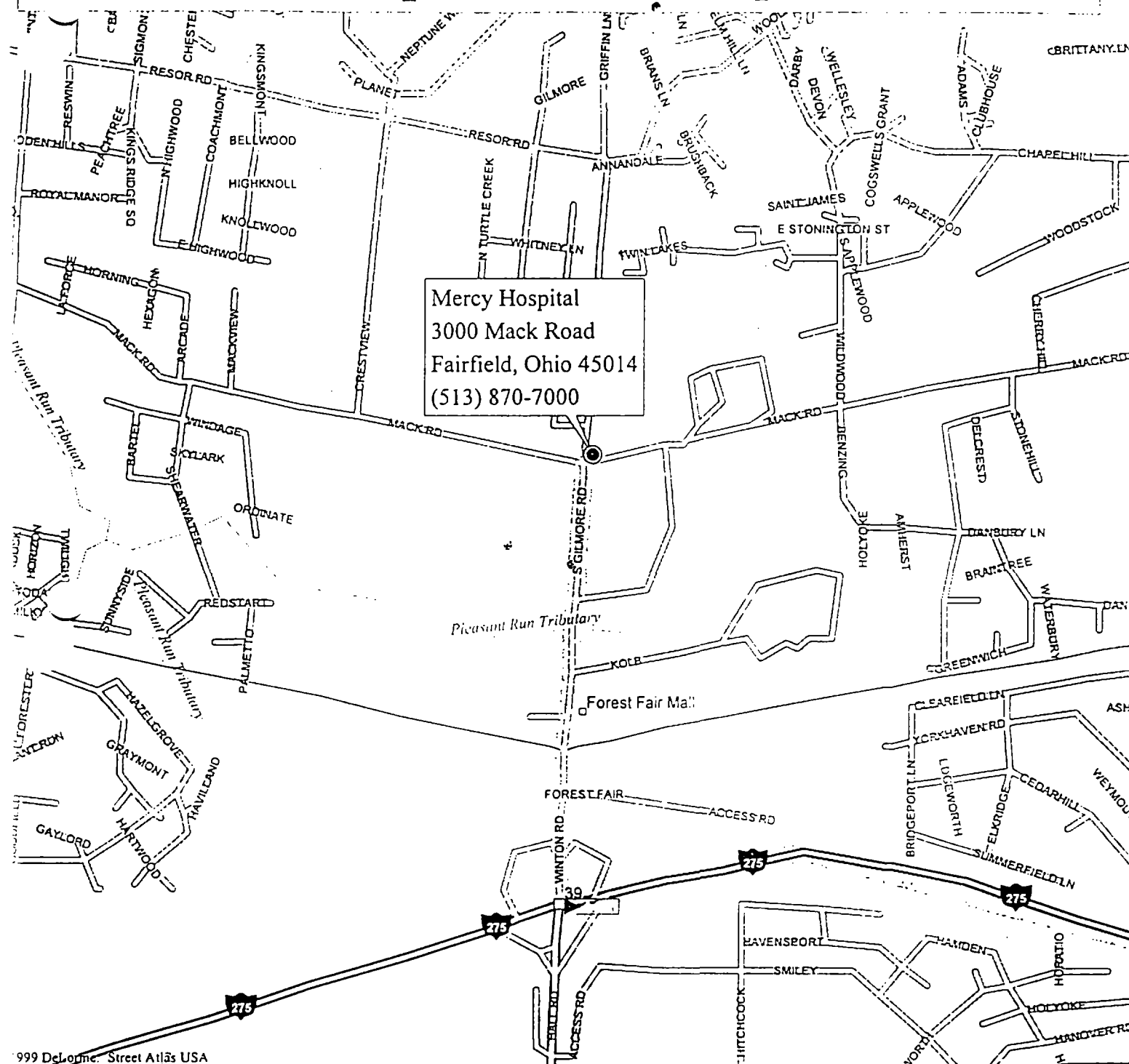
| Organization/Agency | Phone |
|--|-------------------------------------|
| Mercy Hospital <i>(Use by site personnel is only for non-emergency cases)</i> 3000 Mack Road Fairfield, OH 45014 (See attached pages for route maps) | (513) 870-7000 |
| Police | 911 Non-emergency (513) 777-2231 |
| Fire Department | 911 Non-emergency (513) 777-1133 |
| State Police | 911 |
| Ambulance Service <i>(EMT will determine appropriate hospital for treatment and transport)</i> | 911 |
| Butler County Emergency | (513) 887-3472 |
| Cincinnati Drug and Poison Information Center <i>(Ohio only)</i> | (800) 872- 5111 |
| - Outside Ohio | (513) 558-5111 |
| Ohio EPA - Emergency Spill Notification | (800) 282-9378 |
| Poison Control Center | (800) 632-2727 |
| Pollution Emergency | (800) 292-4706 |
| National Response Center | (800) 424-8802 |
| Chem-Trec | (800) 424-9300 |
| Title 3 Hotline | (800) 535-0202 |
| West Chester Coalition on Skinner Cleanup | (513) 779-4424 |

Table: 9 Emergency Contacts (Continued)

| <i>Public Utilities</i> | <i>Phone</i> |
|---|----------------------------------|
| Utility Clearance (<i>call prior to intrusive activities in areas not previously cleared</i>) Ohio Utility Protection Service (OUPS) | (800) 362-2764 |
| Cinergy | (800) 543-5599 |
| Electric | (513) 651-4182 (800) 543-5599 |
| Gas | (513) 651-4466 (800) 634-4300 |
| Phone | (513) 565-2210 |

ADDITIONAL CONTACTS (IF NECESSARY, SITE PERSONNEL WILL BE INSERTED BELOW)

Mercy Hospital Route Map - Detail



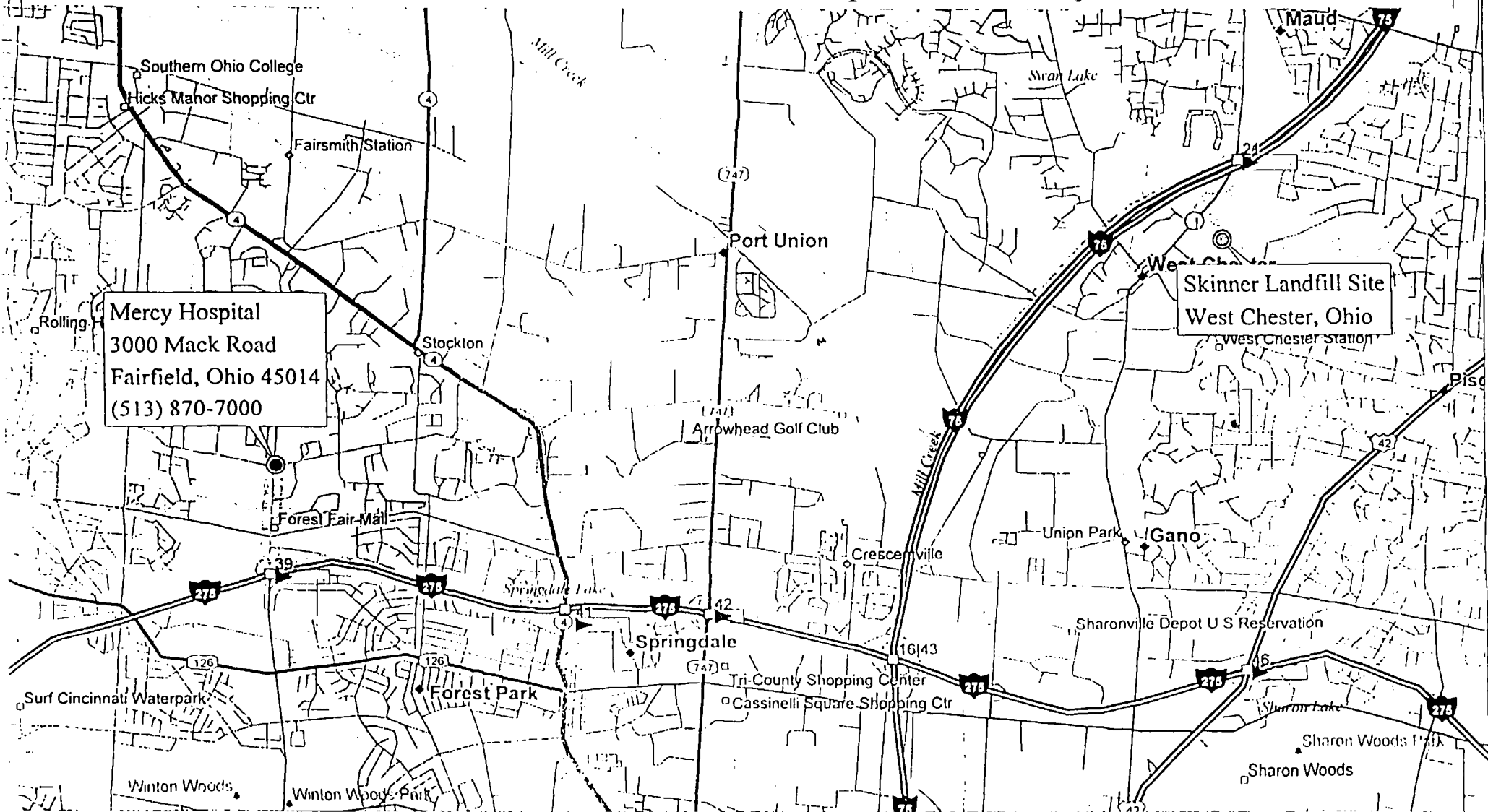
Map 15.00
 Date Jan 05 09:22 2000
 Scale 1:15,625 (at center)
 1000 Feet

500 Meters

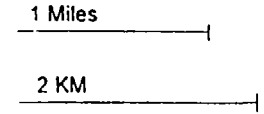
- | | |
|---------------------------|---------------------|
| Local Road | Exit/Lodging |
| Major Connector | Exit/Food |
| State Route | Exit/Other Services |
| Primary State Route | County Boundary |
| Interstate/Limited Access | River/Canal |
| Exit | |
| Point of Interest | |
| Exit/Gas | |



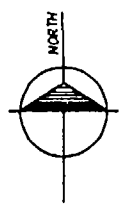
Skinner Landfill to Mercy Hospital Route Map



Mag 13.00
Wed Jan 05 09:18 2000
Scale 1:62,500 (at center)



- | | | | |
|---------------------------|-------------------|---------------------|-----------------|
| Local Road | US Highway | Exit/Gas | Cemetery |
| Major Connector | Exit | Exit/Lodging | County Boundary |
| State Route | Railroad | Exit/Food | Land |
| Primary State Route | Point of Interest | Exit/Other Services | Water |
| Trail | Small Town | Locale | Woodland |
| Interstate/Limited Access | Park/Reservation | Public Airport | River/Canal |



8.0 SITE CONTROL

The purpose of site control is to minimize potential contamination of workers, protect the public from the site's hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Site work zones will be established at each work area, and if required, will be established directly prior to the work being conducted. The work zones will be drawn on site maps, posted in the site trailer/office and discussed during the daily safety meetings.

Each work area will establish three zones:

- **Exclusion Zone (EZ):** Contaminated work area.
- **Contamination Reduction Zone (CRZ):** Decontamination area.
- **Support Zone (SZ):** Uncontaminated, clean area.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is an area accessible to the public.

- **The Exclusion Zone** is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities will be allowed in the Exclusion Zone.
- **The Contamination Reduction Zone** is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination. Decontamination is explained in Section 9.0 of this plan.
- **The Support Zone** is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone should have negligible potential for exposure to contaminants and is equivalent to that of background.

Employees will establish a decontamination area and Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access. All personnel leaving the Support Zone, in addition to the associated PPE required, will be required to wear (at a minimum) chemical-resistant outer boots when traversing the site.

9.0 DECONTAMINATION

9.1 PERSONNEL DECONTAMINATION

All PPE will be disposed of or decontaminated at lunch or at the conclusion of each workday. A designated container for protective suits and other disposable equipment will be located on the site. Protective suits, respirator cartridges, and other disposable clothing (e.g., inner gloves) will be doffed at the conclusion of each workday and replaced with new equipment before starting work the following day. Respiratory equipment, boots, outer gloves, and foul weather gear will be washed and rinsed at the end of the day and stored in sanitized bags. Decontamination of PPE will consist of manual rinses of Alconox (or equivalent), tap water and/or plain tap water.

Before any eating, smoking, using smokeless tobacco, or drinking, personnel will, at a minimum, wash hands, arms, neck, and face.

9.1.1 PERSONNEL DECONTAMINATION STEPS

MODIFIED LEVEL D

In EZ (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In CRZ (keeping the more contaminated equipment closest to the boundary of the EZ):

7. Wash protective suits and safety boots
8. Rinse protective suits and safety boots
9. Safety boot removal
10. Remove protective suit
11. Wash inner gloves
12. Rinse inner gloves
13. Remove inner gloves.
14. Remove inner clothing (if necessary)

In SZ:

15. Finish with personal decon/hygiene wash procedures
16. Redress (if necessary).

LEVEL C

In EZ (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination

3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In CRZ (keeping the more contaminated equipment closest to the boundary of the EZ):

7. Wash protective suits and safety boots
8. Rinse protective suits and safety boots
9. **Change out (if required): Filter/mask change and redress (boot covers and outer gloves)**
10. Safety boot removal
11. Remove protective suit
12. Wash inner gloves
13. Rinse inner gloves
14. Remove respirator/mask
15. Remove inner gloves.
16. Remove inner clothing (if necessary)

In SZ:

17. Finish with personal decon/hygiene wash procedures
18. Redress (if necessary).

LEVEL B

In EZ (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In CRZ (keeping the more contaminated equipment closest to the boundary of the EZ):

7. Wash SCBA/airline equipment, protective suits and safety boots
8. Rinse SCBA/airline equipment, protective suits and safety boots
9. **Change out (if required): Tank change and redress (boot covers and outer gloves)**
10. Safety boot removal
11. SCBA backpack or airline equipment removal
12. Remove protective suit and/or splash suit
13. Wash inner gloves
14. Rinse inner gloves
15. Remove face piece/mask
16. Remove inner gloves.
17. Remove inner clothing (if necessary)

In SZ:

17. Finish with personal decon/hygiene wash procedures

18. Redress (if necessary).

9.2 EQUIPMENT DECONTAMINATION

All equipment removed from the EZ will be considered contaminated and, therefore, will be thoroughly decontaminated before it is removed from the site. Decontamination procedures will vary depending on the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the CIH.

Steam cleaning or pressure washing will decontaminate heavy equipment (reference SOP 24 in Appendix A). Small or delicate equipment (including drum sampling devices, etc.) may be washed using a mixture of Alconox and water (or equivalent solution/mixture), and followed by a final rinse with water.

9.3 DISPOSAL

Liquids and disposable protective clothing will be treated as contaminated waste and disposed of properly. Water generated from equipment decontamination will be retained for disposal. A dumpster for "CLEAN TRASH ONLY" will also be available.

10.0 PERSONNEL ACKNOWLEDGEMENT

All employees, subcontractors, and visitors must sign the Health and Safety Acknowledgement form in Appendix F before conducting field activities at this site and/or entering the Exclusion or Contamination Reduction Zones (including decontamination and restricted staging/delivery areas).

By signing this form, employees agree that:

1. I have read this Health and Safety Plan and I understand the requirements of the Plan.
2. I will conduct work at this site in accordance with the requirements of the Health and Safety Plan.

By signing this form, subcontractors and visitors agree that:

1. I have read and understood the potential hazards associated with the site.
2. I will ensure compliance with my company's policies on health and safety in regards to site entry at remediation locations.

APPENDIX A

HEALTH AND SAFETY STANDARD OPERATING PROCEDURES

HEALTH AND SAFETY PROCEDURES

SUBJECT:

TABLE OF CONTENTS

NUMBER:

PAGE: 1 OF: 2

DATE PUBLISHED: April 16, 1991

DATE REVISED: May 3, 1994

| PROCEDURE | NO. |
|---|------------|
| HEALTH & SAFETY PROGRAM PLAN | 1 |
| PROPOSALS | 2 |
| SITE SAFETY PLAN | 3 |
| PROJECTS WITHOUT SITE SAFETY PLANS | 4 |
| GENERAL SAFETY RULES | 5 |
| ACCIDENT/INJURY INVESTIGATION | 6 |
| MEDICAL SURVEILLANCE | 7 |
| AIR MONITORING | 8 |
| SAFETY TRAINING REQUIREMENTS | 9 |
| DAILY SAFETY MEETINGS | 10 |
| RECORDKEEPING | 11 |
| PERSONAL PROTECTIVE EQUIPMENT (PPE) | 12 |
| RESPIRATORY PROTECTION -- EXCEPT SCBA | 13 |
| SELF-CONTAINED BREATHING APPARATUS (SCBA) | 14 |
| WORK ZONES | 15 |
| DECONTAMINATION | 16 |
| HEAT STRESS | 17 |
| CONFINED SPACE ENTRY | 18 |
| LINE ENTRY | 19 |
| HOT WORK | 20 |
| LOCKOUT/TAGOUT | 21 |
| EXCAVATION | 22 |
| UNDERGROUND TANK REMOVAL | 23 |
| HIGH PRESSURE WASHER (LASER) | 24 |
| CRANES AND LIFTING DEVICES | 25 |

HEALTH AND SAFETY PROCEDURES

SUBJECT:

TABLE OF CONTENTS

NUMBER:

PAGE: 2 OF: 2

DATE PUBLISHED: April 16, 1991

DATE REVISED: May 3, 1994

| | |
|--|----|
| FORKLIFTS AND TOW MOTORS..... | 26 |
| PORTABLE LADDERS AND WORK PLATFORMS..... | 27 |
| ELECTRICAL SAFETY..... | 28 |
| SOLVENTS, FLAMMABLES, AND COMPRESSED GASES | 29 |
| PORTABLE FIRE EXTINGUISHERS..... | 30 |
| ASBESTOS..... | 31 |
| CONSTRUCTION/DEMOLITION..... | 32 |
| VEHICLE AND EQUIPMENT OPERATIONS..... | 33 |
| EMERGENCY RESPONSE | 34 |
| WELL DRILLING -- NON-HAZARDOUS SITES | 35 |
| CONTRACTOR REQUIREMENTS..... | 36 |
| INSPECTIONS..... | 37 |
| SUBSURFACE DRILLING | 38 |
| EXCAVATION OF UNKNOWN DRUMS..... | 39 |
| DRUM SAMPLING..... | 40 |
| COLD STRESS | 41 |
| HEARING CONSERVATION..... | 42 |
| TANK CLEANING..... | 43 |
| LARGE CONTAINER/DRUM HANDLING..... | 44 |

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: HEALTH AND SAFETY PROGRAM PLAN | NUMBER: 1 | PAGE: 1 OF: 5 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 3, 1994 | |

This procedure serves to describe key elements of the health and safety program at EARTH TECH. The policies and procedures that follow are the vehicle through which this safety program is implemented as well as providing the health and safety organization a tangible audit measure.

1.0 SAFETY ORGANIZATION

The safety program for EARTH TECH is administered by a corporate Health and Safety Manager. The corporate Health and Safety Manager reports directly to the corporate president. The site safety officers report to the corporate Health and Safety Manager.

The Health and Safety Department is responsible for establishing safety procedures and protocols. The operating arm of the company is responsible for administration of the safety procedures and protocols.

2.0 SAFETY RESPONSIBILITY

At EARTH TECH the safety and protection of employees, clients, and the community is the first priority. This concern for safety is not exclusive to field operations but extends to the office surroundings, laboratories, and shop facilities. If a project or activity is unsafe, this activity or project will not be attempted until conditions are made safe.

The operating president and operating vice presidents are the primary operational safety officials in the company. The responsibility for operational safety is delegated to the division managers, project managers, shop supervisors, and site supervisors. The Site Supervisor and the Shop Supervisor are the primary safety officials at the working level.

Health and Safety Department personnel are responsible to ensure that the primary safety officials are carrying out operational safety in an effective manner.

Every employee, regardless of job title, shares the responsibility for safety. Both favorable and unfavorable safety reports and audits will be entered into an employee's personnel file. These will be reviewed and weighed during salary and promotion evaluations.

3.0 PRIMARY SAFETY DEPARTMENT FUNCTIONS

The primary functions of the Health and Safety Department follow:

- Administer medical surveillance program;
- Assists with health/safety portions of proposals;
- Prepare site safety plans;
- Provide safety training/maintain training records in coordination with the training department;
- Auditing safety procedures and protocols at project sites, shops, and offices;
- Maintain OSHA accident investigations and records;

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: HEALTH AND SAFETY PROGRAM PLAN | NUMBER: 1 | PAGE: 2 OF: 5 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 3, 1994 | |

- Verify OSHA compliance under 29 CFR 1910 and 1926;
- Verify EPA compliance under 40 CFR 364, 355, and 370;
- Assist with preparation of safety protocols for specific tasks;
- Provide site safety officers, as required;
- Provide safety literature;
- Promotes safety and health within the company; and
- Act as internal health and safety consultants.

In an effective safety organization, the role of the safety professional is as an advisor and consultant and the role of assigned health and safety personnel should be directed to that effort.

4.0 REGULATORY COMPLIANCE

The policy of this company will be to comply with all client, local, state, and federal regulations to the best of our ability. It is the responsibility of all personnel to perform all work in full compliance with regulations. Health and Safety personnel will bring any concern regarding health and safety compliance to the attention of supervisory operating personnel immediately.

5.0 SAFETY GOALS

The goal of the Health and Safety Department is to ensure a safe working environment, protect workers from harm, and protect the company from that liability associated with an unsafe working environment.

Other goals are to eliminate workplace accidents, gain worker acceptance through cooperation and training and provide our clients with a responsible, well-trained, safety oriented, work force.

6.0 SAFETY TRAINING

Hazardous Waste/Materials Field Workers

All EARTH TECH field workers will receive the 40-hour training required for hazardous-waste workers/emergency response personnel outline in 29 CFR 1910.120(e). All persons completing this training must pass a written examination with a minimum score of 70 percent to demonstrate that they adequately understand the material. Supervisory personnel will complete a minimum of 8 additional hours of training. Following training, the 3-day supervised field work required by 29 CFR 1910.120(e) will be completed and documented.

Annually, all EARTH TECH field workers will complete the refresher training required by 29 CFR 1910.120(e).

All training will be documented by records maintained by the Industrial Hygiene Department.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEALTH AND SAFETY PROGRAM PLAN

NUMBER: 1

PAGE: 3 OF: 5

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

Daily Field Safety Training

At each active work site, a daily safety training session will be conducted by the site supervisor or his designee in order to inform all personnel of the expected hazards at the site and how best to eliminate or protect from those hazards. A specific safety topic should also be addressed. All safety training will be documented in a site safety log for the site including the topics addressed and the personnel present. Prepared forms are also available to document the daily meetings.

Shop Personnel

All shop personnel will receive training in accordance with 29 CFR 1910.1200 Hazard Communication (compliance date May 23, 1988). This standard mandates worker training for chemical hazards in the workplace.

First Aid/CPR

It will be a company goal that at least 10 percent of the work force receives First Aid and CPR training from the Red Cross on an annual basis. This should provide approximately 20 percent of trained personnel at each work site.

7.0 SITE SAFETY PLAN

A written site safety plan is required at all EARTH TECH work sites. This site safety plan should generally conform to that required by 29 CFR 1910.120(b)(1)(n) "Site Specific Safety and Health Plan Chapter".

Generally, a representative of the Health and Safety Department will prepare the safety plan before site work commences. In an emergency, however, the site supervisor or acting site safety officer may be required to generate an interim site safety plan until a representative of the Health and Safety Department arrives on scene or develops a plan.

8.0 MEDICAL SURVEILLANCE

All employees who perform work at hazardous-waste sites or perform emergency response will be enrolled in the EARTH TECH medical surveillance program. This program conforms to 29 CFR 1910.120(f)-Medical Surveillance. A copy of the Medical Surveillance Program is included as Health and Safety Procedure No. 7.

9.0 ACCIDENT INVESTIGATION

All accidents will be thoroughly investigated by the supervisor of the person(s) involved in the accident. The employee, the supervisor, and the site safety officer (if assigned) will sign the accident investigation form. The form must be submitted to the corporate office to comply with

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: HEALTH AND SAFETY PROGRAM PLAN | NUMBER: 1 | PAGE: 4 OF: 5 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 3, 1994 | |

OSHA requirements. Instructions for completing the investigation are found on the form. A copy of the EARTH TECH Incident Investigation Form is in Health and Safety Procedure No. 6.

Serious accidents such as those involving hospitalization or injuries requiring more than one visit to a physician may be investigate by the Health and Safety Department. The Vice President or Health and Safety Manager may also request that a specific written accident investigation be conducted in the event of an unusual or serious injury or accident.

10.0 SITE INSPECTIONS

Weekly inspections will be made of the work area. The inspection will be made by the supervisor, his designated alternative, or the site safety officer. Discrepancies found during an inspection will be corrected as soon as practicable. Serious safety violations will be corrected immediately. An inspection record will be maintained in the site safety log. The inspection will be guided by the site safety inspection check-off list.

Additionally, the corporate Health and Safety Manager will make periodic unannounced inspections of work sites on his own discretion or at the request of a worker.

11.0 FIRST AID

Each work site must be evaluated to determine the potential requirement for medical emergencies. At a minimum, an industrial first aid kit will be provided as well as a Red Cross trained employee. We will strive to ensure that a minimum of 10 percent of the employees are first aid and CPR trained and their training is current. Supervisors will ensure that the emergency telephone numbers are correct. Additionally, a map indicating the route to the designated hospital emergency room will be posted in the office trailer. In the event the work site is remote, the supervisor should evaluate the need for an Emergency Medical Technician and/or on site ambulance service.

12.0 SITE SAFETY OFFICER

Responsibility of the Site Safety Officer

The Site Safety Officer, in conjunction with the corporate Health and Safety Manager, is generally responsible to prepare the site safety plan and to ensure compliance with the site safety plan. He is also responsible to ensure that personnel are made aware of the hazards presented by each job site. The best way to communicate these hazards is by requiring that all personnel read and initial or certify that they have read and understand the plan. The initial site safety meeting should address the content of the site safety plan. The site safety plan will be reviewed with personnel new to the project.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEALTH AND SAFETY PROGRAM PLAN

NUMBER: 1

PAGE: 5 OF: 5

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

Authority of the Site Safety Officer

Health and Safety personnel have the authority to suspend any activity or project they deem to be inherently unsafe. Work will not resume until the project or activity is brought into compliance. Any disputes over such matters will ultimately be decided upon by the corporate Health and Safety Manager and the division Vice President.

13.0 REVIEW OF HEALTH AND SAFETY STATISTICS

On a periodic basis as follows, managers will be required to review accident statistics for their divisions/personnel. These statistics will be furnished to managers by the corporate Health and Safety Department.

Quarterly

§ Accidents by division (OSHA recordable)

Annually

§ OSHA 200 Form (post for month of February)

§ Accident/injury rates by division

14.0 SPECIFIC WRITTEN SAFETY PROCEDURES/PERMITS

Safety Procedures

The following written safety procedures have been prepared in order to ensure that the operation is conducted safely and/or to ensure that the operation is conducted in full compliance with OSHA/EPA regulations.

All EARTH TECH personnel will be aware of these safety procedures and comply fully.

Permits

The following procedures require that a permit be completed before the work can be undertaken. The permit procedure is required in order that operating personnel can ascertain that the specific task can be safely accomplished after requirements are met.

- Confined Space Entry
- Hot Work Permit
- Line Entry

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

PROPOSALS

NUMBER: 2

PAGE: 1 OF: 1

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

Health and safety considerations are to be addressed in every proposal so that the projects costs may be accurately estimated.

2.0 PURPOSE

This procedure describes requirements for providing health and safety input into the proposal preparation process.

3.0 REQUIREMENTS

- 3.1 The proposal writer will consult with the regional Health and Safety Manager in order to identify the anticipated level of protection and any other safety-related requirements.
- 3.2 The documented titled "Health and Safety Guidelines" will normally be included in the proposal package.
- 3.3 The corporate Health and Safety Manager will prepare (or, as a minimum, review) any site specific safety plan required for a proposal.

1 forms sep proposal 2

HEALTH AND SAFETY PROCEDURES

SUBJECT:

Site Safety Plan

NUMBER: 3

PAGE: 1 OF: 2

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

A site safety plan will be prepared for all projects prior to initiation of work. Exceptions are activities described in health and safety procedure No. 4, "Projects Without Site Safety Plans".

2.0 PURPOSE

This procedure outlines the minimum requirements for preparing a site safety plan.

3.0 GENERAL REQUIREMENTS

- 3.1 The Project Manager is responsible for assuring that a site safety plan is prepared.
- 3.2 Employees involved in working on projects involving hazardous materials will be trained in the contents of the site safety plan prior to work on site.
- 3.3 The site safety plan will be available on the work site for inspection by employees, clients, or OSHA personnel.
- 3.4 The site safety plan will address as a minimum the following items:
 - Names of key personnel responsible for site health and safety including the Site Safety Officer and the Site Supervisor;
 - An area map showing the site;
 - Establishment of work zones, including a site map;
 - A health and safety hazard evaluation for each site task and operation, including chemical and physical hazards;
 - Personal protective equipment requirements;
 - Contaminant monitoring requirements - this includes frequency and type of air monitoring, techniques and instrumentation to be used, and methods of maintenance and calibration of the instrumentation;
 - Actions to be taken if monitoring indicates that the level of protection is not adequate;
 - Decontamination procedures;
 - A contingency plan for safe and effective responses to emergencies including necessary personal protective equipment and other equipment;

HEALTH AND SAFETY PROCEDURES

| | | |
|----------------------------------|--------------------------------|---------------|
| SUBJECT: Site Safety Plan | NUMBER: 3 | PAGE: 2 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

- Phone numbers of police, fire, and medical facilities as well as maps to designated medical facilities;
- Medical surveillance;
- Training requirements;
- Confined space entry requirements, if applicable;
- Material Safety Data Sheets (MSDSs) for chemicals present on site; and
- Site specific standard operating procedures.

3.5 All site safety plans will be reviewed by the Health and Safety Manager.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

Projects Without Site Safety Plans

NUMBER: 4

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

Site safety plans will be developed for all projects which may involve exposure to hazardous materials. Certain activities, however, may occur prior to preparation of the site safety plan.

2.0 PURPOSE

This procedure describes minimum requirements for conducting activities where no site- specific safety plan exists.

3.0 REQUIREMENTS

- 3.1 Only on-site activities which do not involve exposure to hazardous materials may be conducted prior to preparation of the site safety plan. Such activities may include pre-bid job walks or site surveys.
- 3.2 If a possibility for exposure exists prior to preparation of the site safety plan, the operation must be approved by the corporate Health and Safety Manager, who will specify appropriate protective measures including personal protective equipment.
- 3.3 Employees performing work on sites prior to issuance of the site safety plan or on site not requiring a site safety plan are to comply with all provisions of these procedures, including medical surveillance and training.
- 3.4 As a minimum, employees will obtain and comply with any client health and safety procedures which may apply. These may be in the form of standard operating procedures, health and safety procedures, or contract specifications.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

GENERAL SAFETY RULES

NUMBER: 5

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

1.0 POLICY

The following rules generally apply in all areas of safety.

2.0 PURPOSE

This procedure provides project managers and personnel with a list of fundamental safety rules not specifically covered in other health and safety procedures.

3.0 GENERAL HEALTH AND SAFETY RULES

- 3.1 Each office/project site will have the appropriate OSHA poster (state or Federal) posted prominently.
- 3.2 Each employee, as a condition of employment, is required to comply with the health and safety procedures and the site safety plan governing in each area the employee is required to work.
- 3.3 Project managers are to review records of each employee to be assigned to work on projects involving hazardous materials and assure that all requirements pertaining to health and safety such as medical surveillance and training are in compliance.
- 3.4 No one will initiate work on a project involving hazardous materials until appropriate training as required by regulation, contract and/or health and safety procedures have been implemented.
- 3.5 All employees are directed to immediately bring to the attention of the Site Supervisor or site safety officer any unsafe condition, practice or circumstance.
- 3.6 The following practices are expressly forbidden during operations on hazardous materials sites:
 - Smoking, eating, or drinking while on site except in designated areas;
 - Ignition of flammable or reactive materials;
 - Entry on site without proper safety equipment;
 - Conduct of operations on site without backup personnel as described in the site safety plan;
 - Wearing of facial hair which may interfere with a respiratory seal on a job site which may require respiratory protection; and

HEALTH AND SAFETY PROCEDURES

SUBJECT:

GENERAL SAFETY RULES

NUMBER: 5

PAGE: 2 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- *Wearing of contact lenses on a hazardous materials site.*
- 3.7 A daily safety meeting will be held at hazardous materials sites to review site hazards, changes in levels of personal protective equipment, special safety precautions, and emergency response per Health and Safety Procedure No. 10.
- 3.8 Every accident is to be reported to the Site Supervisor immediately, whether or not anyone is injured.
- 3.9 Employees may not alter or attempt to repair any item of safety equipment unless specifically authorized and qualified.
- 3.10 An employee must not attempt to move or lift heavy or bulky objects beyond his capacity.
- 3.11 Possession or use of intoxicants or drugs on company premises or job sites is prohibited. Employees may not report for work or perform duties while under the influence of intoxicants or drugs. Prescription drugs are to be reported to the Site Supervisor and shall not impair the ability of the worker to work safely.
- 3.12 Walking under or working under a suspended load is not permitted.
- 3.13 Legible and understandable precautionary labels will be prominently affixed to containers or raw materials, intermediates, products, by-products, mixtures, scrap, waste, debris, and contaminated clothing, per DOT, EPA, OSHA, or other applicable regulations.
- 3.14 A sufficient number of fire extinguishers, as determined on site with a minimum rating of 10B:C, will be strategically located throughout the areas where active work is progressing so as to limit the travel distance by personnel to less than 75 linear feet.
- 3.15 All personnel will avoid contact with potentially contaminated substances. Walking through puddles or mud, kneeling on the ground, or leaning against drums is to be avoided.
- 3.16 Monitoring equipment will not be placed on potentially contaminated surfaces.
- 3.17 Personnel on site will use the "buddy" system (pairs). Buddies should prearrange hand signals for communication in case of lack of radios or radio breakdown. Communication or visual contact will be maintained between crew members at all time.
- 3.18 Contaminated protective equipment will not be removed from the regulated area until it has been cleaned or properly packaged and labeled.
- 3.19 Employees will not be permitted to exit the contamination reduction zone until contaminated clothing and equipment have been removed and employees have washed their hands and face with soap and water. The only exception is in an emergency situation.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

GENERAL SAFETY RULES

NUMBER: 5

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- 3.20 Removal of materials from protective clothing equipment by blowing, shaking, or any other means which may disperse materials into the air is prohibited.
- 3.21 Portable or fixed emergency shower/eyewash stations may be required by the site safety plan for the regulated area.
- 3.22 A deluge shower or hose and nozzle will be available in the contamination reduction zone to wash down heavily contaminated personnel before doffing protection clothing.
- 3.23 As appropriate, equipment on site will be bonded and grounded spark proof, and explosion resistant. Ground fault interrupters will be utilized. See Health and Safety Procedure No. 27.
- 3.24 Guard rails and toe boards will be in place for all work on elevated platforms exceeding 6 feet in height.
- 3.25 Accidents and injuries can and do occur in office environments. Attention and safety awareness are important in offices as well as job sites. Some commonly violated office safety rules include:
- Aisles, passageways or corridors are not to be blocked at any time;
 - Desk drawers, cabinet doors and file cabinet drawers are to be kept closed when not in use;
 - Use a proper platform, not a swivel chair for reaching in places; and
 - Fire extinguishers are to be readily available in each office and an emergency evacuation plan implemented.

FORMS/SOP GSR.5

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ACCIDENT/INJURY INVESTIGATION

NUMBER: 6

PAGE: 1 OF: 4

DATE PUBLISHED: April 16, 1991

DATE REVISED: May 3, 1994

1.0 POLICY

All injuries and accidents will be reported promptly to the site supervisor and documented.

2.0 PURPOSE

This procedure provides for reporting and documenting accidents, injuries, and work-related illnesses.

3.0 PROCEDURE

3.1 Reportable incidents include, but are not limited to:

- Injuries to personnel of any magnitude;
- Tool or equipment failure which results or could result in serious injury;
- Fire or explosion of any magnitude;
- Exposure of unprotected personnel to toxic agents;
- Vehicle accidents; and
- Any damage to client or private property.

3.2 All injuries/illnesses, no matter how minor they appear, are to be reported to the employee's immediate supervisor. The supervisor should then see to it that the incident is logged and properly reported.

3.3 Under no circumstances should an injured employee drive himself/herself to the hospital, clinic, etc. An employee with minor injury may be transported by car after first aid treatment is given. The employee who transports the injured person should be trained in first aid and CPR whenever possible. Any injury that is not minor, or when in doubt of severity of injury, should be transported by ambulance.

3.4 Injured employees who require medical treatment or in which the employee was taken to a doctor, hospital, clinic, etc., should not be allowed to resume work without a written return to work and/or any work limitations letter. Should a statement, such as "light duty" be given, corporate Health and Safety will call the treating physician to determine the exact restriction that is needed. It is essential the treating physician understands the type of work the employee normally performs and that alternate work is available to meet work restrictions.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: ACCIDENT/INJURY INVESTIGATION | NUMBER: 6 | PAGE: 2 OF: 4 |
| | DATE PUBLISHED: April 16, 1991 | |
| | DATE REVISED: May 3, 1994 | |

3.5 The CEO of HazWaste, President of the company, division Vice President, and corporate Health and Safety Department are to be notified immediately of any lost time accident. Notice is to be made by telephone or other available means.

3.6 All bills and receipts for medications and pharmacy supplies pertaining to work related injuries should be sent to the employees assigned division to the attention of the person who handles worker's compensation claims. The employee should write on the bill or receipt the date of injury and diagnosis.

4.0 FORMS AND REPORTING PROCEDURES

4.1 Injury/Illness Log

- Injury/Illness Log is to be kept at the location where first aid treatment is given at all EARTH TECH project sites. All injuries, no matter how minor they appear, are to be logged. Minor injuries such as small cuts, scrapes, small first degree burns, and splinters that require only first aid treatment, are entered on this log only. Any incident that requires the completion of the Incident Investigation Report, as described below must also be logged. Maintaining this log will help in meeting OSHA recordkeeping requirements and in responding to minor incidents before they become major. An example of a properly completed log is attached. On the last work day of each week, a copy of the log is to be faxed to:

- Corporate Health and Safety Manager

(If a fax is not available, notify the home office by the same method time card information is sent or telephone the corporate Safety Manager.)

The original log should be retained in site records.

4.2 Accident Report

- Incident Investigation Report (Accident Report) to be completed in the following work-related circumstances: (this report is required by OSHA).
- Any work-related back injuries;
- All work-related chemical exposures;
- Any work-related injury/illness which involves medical treatment (treatment by doctor, hospital, clinic, chiropractor, dentist);
- Any work-related accident that results in death of an employee;

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ACCIDENT/INJURY INVESTIGATION

NUMBER: 6

PAGE: 3 OF: 4

DATE PUBLISHED: April 16, 1991

DATE REVISED: May 3, 1994

- Any incident that involves property damage but not necessarily employee injury; and
- Any work-related incident (near miss) in which an injury could have occurred and that attention is needed to prevent similar incidents from occurring and preventing an injury/accident.

Note: Minor injuries such as scrapes, small cuts, small splinters that require first aid treatment only, do not require completion of the Incident Investigation Report. However, should condition of injury change and require medical treatment, then a report must be completed. If in doubt as to how to classify an injury (first aid or medical), complete the Incident Investigation Report.

The Incident Investigation Report is to be completed the day of the injury/incident.

The Site Supervisor shall:

- Notify the corporate Health and Safety Manager by telephone;
- Complete the report within 24 hours of the occurrence;
- Have involved employee(s) review and sign the report;
- Send original report to the corporate Safety Manager; and
- Retain a copy of the report for site records.

The Project Manager or supervisor shall:

- Notify the injured employee's divisional vice president and company president of the injury incident;
- Obtain additional information as needed for investigation of the occurrence (photographs, diagrams, witness statements, doctor slips, etc.);
- Send a copy of the report to the division secretary handling worker's compensation of the injured employee;
- Forward all original reports to corporate Health and Safety for retention in the employee's medical file; and
- Retain a copy for his/her file.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: ACCIDENT/INJURY INVESTIGATION | NUMBER: 6 | PAGE: 4 OF: 4 |
| | DATE PUBLISHED: April 16, 1991 | |
| | DATE REVISED: May 3, 1994 | |

For Lost Time Injury

The Project Manager or supervisor shall:

- Complete the Notice of Lost Time Injury and fax a copy to Divisional vice president and company president and corporate Health and Safety within 24 hours of the incident.

The Project Manager shall:

- Conduct a joint site inspection with the Safety Manager and submit a brief report to his division vice president and corporate health and safety manager detailing the major cause(s) of the accident and corrective action implemented within five days of the incident.

4.3 Return to Work/Authorization for Release of Medical Records

The following two forms are to be completed whenever an injured/ill employee is given treatment at a hospital, clinic, doctor's office, etc. These forms are necessary for obtaining additional information to be used in determining OSHA recordability and filing of worker's compensation claims. Both original forms are to be attached to and submitted together with the Incident Investigation Report.

- Return to Work form is to be completed by the treating physician. The employee shall return the original form to his supervisor prior to returning to work or within 24 hours of a lost time incident. No employee is to be allowed to return to work following treatment of an injury/illness without this completed form. Restrictions given by the physician are to be followed. The supervisor shall contact the treating physician or Corporate Health and Safety should there be any question regarding an employee's ability to return to work.
- Authorization for Release of Medical Records is to be completed by the supervisor or treating agency and signed by the employee. This form is required to obtain doctor's reports, emergency room records, x-ray reports, lab reports, etc., pertaining to the work-related incident. The original form is to be attached to the Incident Investigation Report.

By following these guidelines and procedures, we hope to ensure accurate recording of work related injuries and illnesses and improve filing of workers compensation claims.

Supervisor's Report of Incident

This is an official document to be initiated by the injured employee's Supervisor. Please answer all questions completely. Fax to your Region EHS Manager within 24 hours of the injury. See reverse side for instructions.

Section 1: Employee (Must complete each item or processing delays will occur) - Print Clearly

| | | | | | |
|---------------------------------|----------------------------------|---|------------------------------------|------------|-------------|
| SCMS Claim#: _____ | | WC Location Code: _____ | | | |
| (877)261-8926 | | | | | |
| Employee Data | | S.S. No. | Sex | Birth Date | |
| Injured's Name | | Phone | Marital Status | Dependents | |
| Home Address | | City | State | Zip Code | |
| Job Title | Dept No. | Office Location Address | | | |
| <input type="checkbox"/> Injury | <input type="checkbox"/> Illness | <input type="checkbox"/> Vehicle Injury | <input type="checkbox"/> Near Miss | Hire Date | Hourly Wage |

Section 2: Supervisor (Must complete each item or processing delays will occur) - Print Clearly

| | | | |
|--|------------------------------------|---|------------------|
| Date of Incident | Time | Date Reported | To Whom |
| Client Name | Job Assignment at Time of Incident | | Time Shift Began |
| Exact Location & Address of Incident | | Did injured leave work? When? | |
| Has injured returned to work? <input type="checkbox"/> Yes <input type="checkbox"/> No | | Did employee miss a regularly scheduled shift? <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| Doctor/Hospital Name | | Address of Hosp | |
| Witness Name | | Statements Attached <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| Nature of Injury | | Body Part | |
| Medical Attention | | | |
| Describe Incident | | | |
| What caused the incident? | | | |
| Corrective Action(s) to Prevent Future Occurrence: | | | |
| Supervisor/Foreman (Print Name) | | Signature | Telephone Date |

Section 3: Manager

| | | |
|--|-----------|----------------|
| Comments on incident and corrective action | | |
| | | |
| Manager (Print Name) | Signature | Telephone Date |

Section 4: Environmental, Health and Safety

| | | | | | | | |
|--|--|---|----------|--|--|--|--|
| Concur with action taken? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | Remarks: | | | | |
| | | | | | | | |
| OSHA Classification Pending <input type="checkbox"/> | | <input type="checkbox"/> Incident only | | <input type="checkbox"/> First aid | | <input type="checkbox"/> No lost work days | |
| OSHA Recordable <input type="checkbox"/> Yes <input type="checkbox"/> No | | <input type="checkbox"/> Lost work days _____ | | <input type="checkbox"/> Days of restricted activity _____ | | <input type="checkbox"/> Fatality | |
| EHS Professional (Print Name) | | Signature | | Date | | Telephone | |

Supervisor's Report of Incident Instructions For Completion

The following types of incidents must be reported using this form:

1. Occupational Injury or Illness (includes first aid only, medical treatment, hospitalization, fatality)
2. Vehicle Accident Injuries
3. Near Miss (incident where employee(s) could have been injured)

INSTRUCTIONS

Immediate:

1. Employees must report such incidents to their Supervisor immediately.
2. The Supervisor must complete **Sections 1 and 2, Employee Data and the Supervisor Section** of the SRI. Incomplete items will delay timely processing. Any work-related injury or illness that requires medical treatment or care will require notifying SCMS at 877-261-8926.
3. The Supervisor must verbally notify his/her Manager, who in turn must sign **Section 3, Manager**, of the SRI. To avoid delaying SRI process, a separate copy of the SRI with the Manager's signature can be faxed within 3 days to the REHSM.
4. The Supervisor must verbally notify his/her REHSM with a follow-up SRI faxed within 24 hours (see below for fax numbers). The REHSM will review and complete **Section 4, Environmental Health and Safety**, and fax the SRI to the WCA at 804-515-8313.
5. For near-miss situations that could have resulted in an injury to an employee, the Supervisor must notify his/her Manager (see Item 3 above) and the REHSM with a follow-up SRI faxed within 24 hours.

PRIMARY CONTACTS

East REHSM: Dale Prokopchak, CIH, CSP
Telephone: 804-515-8556
Fax: 804-515-8313
Pager: 877-830-1981

WCA:
Telephone: 804-515-8557
Fax: 804-515-8313

Midwest REHSM: Jeff Grant, CIH
Telephone: 616-940-4426
Fax: 616-940-4396
Cell Phone: 734-516-5232

West REHSM: Bob Poll, CIH, CSP
Telephone: 562-951-2242
Fax: 562-495-9257
Cell Phone: 562-884-1414

"Job Hindrances Interrupt or Interfere with the Orderly Progress of the Job."
SUPERVISOR'S INVESTIGATION REPORT

| | | | |
|------------------|-----|-----------------------|------|
| Employee Name | Age | Time | Date |
| Department-Shift | Job | How long on this job? | |

WHAT HAPPENED? (Describe what took place or what caused you to make this investigation.)

WHY DID IT HAPPEN? (Get all the facts by studying the job and situation involved. Question by use of WHY-WHAT-WHERE-WHEN-WHO-HOW.)

WHAT SHOULD BE DONE? (Determine which of the 12 items under EMP require additional attention.)

WHAT HAVE YOU DONE THIS FAR? (Take or recommend action, depending on your authority. Follow up - was action effective?)

HOW WILL THIS IMPROVE OPERATIONS? (Objective: Eliminate job hindrances.)

| | | | |
|-----------------|------|-------------|------|
| INVESTIGATED BY | DATE | REVIEWED BY | DATE |
|-----------------|------|-------------|------|

EQUIPMENT
 Select
 Arrange
 Use
 Maintain

MATERIAL
 Select
 Place
 Handle
 Process

PEOPLE
 Select
 Place
 Train
 Lead



INCIDENT INVESTIGATION REPORT

- _____ ACCIDENT* _____ UNUSUAL OCCURRENCE
_____ INJURY/ILLNESS* _____ NEAR MISS
- 1) Project no.: _____ Project phone no.: _____
Project location: _____
- 2) Employee's full name: _____ Number: _____
If subcontractor, give name/address: _____

- 3) Home address - Street: _____
City/State/Zip: _____
Phone number: _____
- 4) Date of birth (m/d/y): _____ / _____ / _____ 5) SSN _____
- 6) Job title: _____ 7) Assigned division: _____
- 8) Date and time of occurrence: _____
- 9) Date and time reported to company: _____
- 10) Date employee began to lose work time: _____
- 11) Estimated/actual date of return to work: _____
- 12) Describe the apparent extent of injury or illness and parts of body affected (laceration, burn, fracture—right lower leg left index finger).

- 13) Describe treatment given (x-ray, stitches, etc.) If hospital or doctor, give name, address, and phone number and attach return-to-work slip.

- 14) Did a chemical exposure occur? If yes, what known contaminants were present? What type of exposure occurred? (inhalation ingestion, skin contact, etc.)

INCIDENT INVESTIGATION REPORT (continued)

- 3) Describe fully how accident happened, give causes and results. Attach another sheet if necessary: _____

- 16) Exact location where incident occurred: _____

- 17) Names and addresses of witnesses to the incident: _____

- 18) Were emergency procedures adequate? _____
- 19) Who was directly supervising the work? _____
- 20) Work schedule at time of incident: ____ Hours per day ____ Days per week
- 21) Level of personal protective equipment utilized at time of incident: (circle) A B C D
- 22) What direction or training had been given on the task? _____

- 23) How can you or the company prevent similar incidents from happening again? _____

- 24) Did personal protective equipment fail (Tyvek torn, glove ripped, respirator failed, etc.) Describe: _____

- 25) What action has or will be taken to prevent similar occurrences? _____

- 26) Additional comments _____

Signature _____
(Employee)

Date: _____

Signature _____
(Site Supervisor)

Date: _____

Signature _____
(Safety Supervisor)

Date: _____

* Fill out form completely and accurately. Within 48 hours, send a copy of the completed form to the manager, and send original report to Corporate Health and Safety. Retain a copy at the job site. Attach to report any related information (photographs, doctor slips, witness statements, etc.) The injured employee shall contact their home division office for further instruction and forms to be completed on work-related injuries/illnesses.

RETURN TO WORK

Physicians Please complete and return the original form to the employee.

Employee's Name: _____

is able to:

Return to regular work

Return to work with the following restrictions;

Lifting to _____ Standing _____ Sitting _____

Clean office work only _____ Other _____

Restriction is effective until _____

Unable to work, estimate return to work date _____

Signature: _____

Address: _____

* Employee must present this form to his supervisor prior to returning to work

AUTHORIZATION FOR RELEASE OF MEDICAL RECORDS

I, (print full name) _____

hereby authorize (individual or organization holding records) _____

to release to EARTH TECH a copy of all medical records pertaining to my injury/illness of _____

Pertaining to (nature of injury/illness) _____

Please send records to:

(Signature) _____

(Date) _____

Distribution: 1) Original to Corporate Health and Safety
 2) Copy to Site File

NOTICE OF LOST TIME INJURY

Please Type or Print

Employee Name: _____ Employee No.: _____

Supervisor's Name: _____

Project No. and Location: _____

Date of injury: _____ Time: _____

Brief Description of Incident and Injury: _____

Immediate Corrective Action: _____

Tentative Follow-up Corrective Action: _____

Signature: _____ Safety Manager

Date: _____

pc 1)

2)

3)

WORKFORMS PROCEDURES

HEALTH AND SAFETY PROCEDURES

SUBJECT:

MEDICAL SURVEILLANCE

NUMBER: 7

PAGE: 1 OF: 5

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

The medical surveillance program has been established to ensure that personnel are capable of performing their assigned activities, and that the health of the employee is not compromised by potential exposure to chemical or physical agents found at work sites. This program is designed to support and monitor the effectiveness of the primary health and safety goal of controlling worker exposure to hazardous materials.

2.0 PURPOSE

This procedure describes the EARTH TECH medical surveillance program requirements.

3.0 PARTICIPATING EMPLOYEES

3.1 A medical surveillance program is required for employees who are or may be:

- Exposed to substances above permissible levels for 30 or more days per year; or
- Required to wear a respirator for 30 or more days per year; or
- Exposed above permissible levels in accidents or emergency situations.

3.2 Employees who have a potential site exposure risk, work with potentially hazardous materials, are required to wear respiratory devices, or are required to be monitored under other regulations (e.g., DOT drivers) will be monitored.

Other personnel may be monitored on a case-by-case basis. All employees designated to participate in this program are required to do so as a condition of employment.

3.3 Employees who do not fall within the above categories will not be included in the program.

4.0 MEDICAL SURVEILLANCE PROGRAM

The medical surveillance program consists of four parts; a pre-employment medical examination, annual medical examination, project-specific monitoring, and/or medical examination (periodic), and exit medical examination.

Regional managers are responsible for providing to the physician:

- A copy of the OSHA regulation relating to hazardous waste site workers and its appendices (29 CFR 1910.120);
- Description of employee's duties as they relate to exposures;
- Description of the personal protective equipment to be used;

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|---------------------------------|---------------|
| SUBJECT: MEDICAL SURVEILLANCE | NUMBER: 7 | PAGE: 2 OF: 5 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

- Information from previous examinations which may not be readily available to the physician; and
- A copy of the medical program.

4.1 Medical Form

The medical/occupational history and physical form is to be used for all medical examinations. This form incorporates personal, family, occupational history, physical examination information, acknowledgement and authorization to release medical records, and medical certification.

The medical certification form will be used to inform clients that our employees are physically fit to work in hazardous waste operations.

4.2 Pre-Employment Medical Examination

The purpose of the pre-employment examination is three-fold. First, the examination should identify any pre-existing illness or medical problem which will exclude a prospective applicant from employment. Second, the examination should determine if a candidate possesses sufficient physical capabilities to wear respiratory and personal protective equipment, work at heights, work in climatic extremes (heat and cold), and perform strenuous physical labor. Third, the medical information (SMAC-23, EKG, PFT, chest x-ray, urinalysis, audiogram) will serve as a baseline (pre-exposure) against which the yearly or project-specific monitoring can be compared to provide a mechanism for early detection of toxic substance exposure, as well as determine the employee's general fitness for potential exposure to chemicals and physical agents.

During the performance of this pre-employment exam, the employee will complete a pre-employment medical history and sign the medical records release.

In the pre-employment examination, the examining physician will determine if the prospective employee is capable of safely performing the job for which he/she is applying. At the conclusion of the pre-employment examination, the examining physician will carefully review the medical history and result of the physical examination along with laboratory reports, and then determine if the prospective employee is physically capable of safely performing the intended tasks.

Upon a satisfactory review of results, the physician will complete and sign the medical certification/rejection. The physical examination section and medical certification/rejection section must be completed by the physician. A written report of the occupational and medical history, physical exam, and all lab work is required.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|---------------------------------|---------------|
| SUBJECT: MEDICAL SURVEILLANCE | NUMBER: 7 | PAGE: 3 OF: 5 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

The pre-employment examination will consist of the following:

- Occupational and medical history;
- Physical examination;
- Visual test;
- Audiometric test;
- Urinalysis;
- Blood test;
- Chest x-ray;
- Pulmonary functions test; and
- Written report.

4.3 Annual Medical Examination

The annual examination will include an updated medical history, including any occupational exposure from the previous year, and a detailed physical exam featuring the same components as the pre-employment examination. The physician will pay particular attention when comparing the bio-chemical parameters to help ensure no recognized symptoms of toxic exposure have developed during the past year. The physician will complete and sign the medical certification/rejection section. A written report of the occupational and medical history, physical exam, and all lab work is required.

4.4 Driver's Medical Examination

Personnel who drive trucks for the company must annually pass a U.S. Department of Transportation physical. The forms for this examination can be obtained from the Health and Safety Department and will routinely be distributed to the division offices. Driver physicals will consist of a short history and physical examination.

4.5 Project Specific Monitoring and/or Medical Examination (Periodic)

As required for a specific job, when requested by a client, or as deemed necessary upon advice from the Industrial Hygiene Department, a specific medical test(s) may be required for any individual. Additionally, any time an actual exposure above the OSHA permissible exposure limit (PEL) occurs, the employee may be tested for that material to document effect(s) of the exposure.

4.6 Exit Medical Examination

An exit medical examination is required at termination of employment or reassignment to an area where the employee would not be covered. The physician should pay particular attention to the condition of skin and document employee comments as to state of health. A

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|---------------------------------|---------------|
| SUBJECT: MEDICAL SURVEILLANCE | NUMBER: 7 | PAGE: 4 OF: 5 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

written report of the occupational and medical history, physical exam, and all lab work is required.

5.0 MEDICAL RECORDS

The Health and Safety Department will maintain a medical record for each employee consisting of the following:

- Pre-employment, annual, project specific monitoring (periodic), and exit medical histories, including job description and past occupational exposures;
- The results of all medical examinations including pre-employment, annual, periodic testing, including x-ray, examination, and all specific biological monitoring;
- Medical opinions, diagnosis, progress notes, and recommendations of the doctor;
- Description of treatments and prescriptions; and
- Employee medical complaints.

5.1 Confidentiality

The information contained in the employee medical files will be open to review and usage by Health and Safety personnel and examining and consulting physician(s).

Records must be maintained in a locked filing cabinet with access limited to the individuals described above. Upon termination of service, resignation, retirement, or death, the records will be retained for 30 years in accordance to 29 CFR 1910.20.

5.2 Employee's Access to Medical Records

In accordance with 29 CFR 1910.20, all employees may have access to their medical records for the purpose of examination and copying. Access will be granted only to the employee or his designated representative. Forms for requesting access to medical records are available from the Health and Safety Department or the corporate representative responsible for medical records. A copy of this request will be forwarded to the Health and Safety Department for inclusion in the individual's medical file.

6.0 WRITTEN REPORT

- 6.1 The physician will make a written report to the employer of medical conditions which may make the employee an increased risk to work at a hazardous site and any recommendations on limitations on use of a respirator, personal protective equipment, or any limitation as a result of medical conditions. The physician will not reveal diagnosis or conditions

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|---------------------------------|---------------|
| SUBJECT: MEDICAL SURVEILLANCE | NUMBER: 7 | PAGE: 5 OF: 5 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

unrelated to employment, but will inform the employee directly of those conditions and any occupationally-related conditions.

- 6.2 The physician should send all original completed forms, lab tests and written reports to the corporate Health and Safety Department, in Richmond, Virginia, or to the division office which will then forward them to the corporate office.
- 6.3 EARTH TECH will provide the employee with a copy of the written opinion from the examining physician.

7.0 EMERGENCY MEDICAL CARE

- 7.1 The Site Safety Plan addresses emergency medical care, the treatment of personnel, including possible exposures to toxic substances, and injuries due to accidents or physical problems.
- 7.2 During the preparation of the Site Safety Plan, arrangements should be made with a medical treatment facility or alternate health care service to provide care and adequate treatment to personnel working at job sites. Clear, written directions for locating the facility will be included in the plan. The name, address, and telephone number will be conspicuously posted at the job site. The Site Supervisor is responsible for ensuring that any site employee requesting or requiring medical care due to an injury or illness, or exhibiting erratic or uncharacteristic behavior, will receive emergency medical care. Personnel requiring emergency medical treatment will not be allowed back on site without a written release by a physician.

Forms'sop' medsurv 7

HEALTH AND SAFETY PROCEDURES

SUBJECT:

AIR MONITORING

NUMBER: 8

PAGE: 1 OF: 1

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

Air monitoring will be conducted on all projects involving hazardous materials in order to determine the appropriate level of protection and document potential employee exposure.

2.0 PURPOSE

The purpose of this procedure is to describe air monitoring requirements for hazardous materials projects.

3.0 REQUIREMENTS

- 3.1 Direct reading instruments will be used on sites involving hazardous materials. The instrument to be utilized will be specified in the site-safety plan.
- 3.2 Instruments available include portable gas chromatographs (OVA), photoionization detectors (HNU or TIP). Explosimeters, hydrogen sulfide monitors, hydrogen cyanide monitors, carbon monoxide monitors, oxygen monitors, and Draeger tubes will also be utilized depending on the potential health hazards.
- 3.3 An action level will be established in the Site Safety Plan for each suspected airborne contaminant. A chart discussing the action levels will be included in every Site Safety Plan involving hazardous materials.
- 3.4 Instruments will be calibrated daily.
- 3.5 Records of all direct readings will be kept on the form provided.
- 3.6 Personal samples will be collected to determine individual exposures per the Site Safety Plan or per guidance by the Health and Safety Manager. Samples will be logged on a sample log and will follow chain-of-custody requirements.
- 3.7 Results will be posted on site.

INFORMS SOP-AIRMONIT.8

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

INFORMISOPAIRMONIT 8

DIRECT READING INSTRUMENT LOG

Project: _____

Job No.: _____

Date: _____

Operator: _____

Instrument: _____

Calibration: _____

Amt, Component, Date

Sampling Technique: _____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

[illegible]

PERSONAL SAMPLING DATA SHEET

Client: _____

Material: _____

Site Location: _____

Job No.: _____

Sampling Media: _____

[illegible]

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: Safety Training Requirements | NUMBER: 9 | PAGE: 1 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

1.0 POLICY

All employee will be thoroughly trained concerning any and all hazards they may face prior to commencement of project work.

2.0 PURPOSE

The purpose of this procedure is to describe training requirements for employees who may be exposed to hazardous substances, health, or safety hazards.

3.0 REQUIREMENTS

3.1 Prior to working on a hazardous waste site, employees will receive 40 hours of training. Such training will, as a minimum, include:

- Hazard Communication (basic toxicology chemical and physical hazard, labeling, and other information systems);
- Elements of a site safety plan;
- Respiratory protection;
- Personal protective equipment;
- Use of direct reading instruments;
- Medical surveillance;
- Decontamination;
- Site control; and
- General work practices.

3.2 Employees who can show key work experience or a level of training equivalent to that required in Section 3.1, above, may be certified as to the 40-hour initial training.

3.3 An on-site safety training session addressing site specific safety concerns will be conducted by the safety officer prior to work at hazardous waste sites involving potential exposures to hazardous materials. Attendance at this session will be formally recorded using the form provided.

3.4 Specific training is required prior to working with certain hazardous materials such as asbestos, lead, or other known carcinogens.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

Safety Training Requirements

NUMBER: 9

PAGE: 2 OF: 2

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 3.5 Operators of equipment such as forklifts of high-pressure washers must be trained prior to using the equipment.
- 3.6 Employees working on a RCRA site will receive 24 hours of initial training.
- 3.7 In addition to the 24- or 40-hour initial training, all employees involved in hazardous waste activities will receive 8 hours annual refresher training.
- 3.8 Daily safety meeting will be conducted per Health and Safety Procedure No. 10.
- 3.9 Contractor employees must provide proof of appropriate training per Health and Safety Procedure No. 32.
- 3.10 Employees assigned to emergency response activities will receive training specific to the equipment and procedures of such activities.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

DAILY SAFETY MEETINGS

NUMBER: 10

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

1.0 POLICY

Daily safety meetings will be held at all job sites.

2.0 PURPOSE

The purpose of this procedure is to describe the requirements for daily safety meetings.

3.0 REQUIREMENTS

3.1 Meetings are to be conducted by the supervisor, site safety officer, or any other qualified person.

3.2 The meetings are to be documented on the tailgate safety meeting form (see next page) and kept at the job site. Upon completion of the project, a copy of each meeting form is to be kept in the project file.

3.3 Possible topics include, but are not limited to:

- Site hazards;
- Personal protective equipment;
- Change in level of protection;
- Emergency response;
- Decontamination;
- Specific sections of the site health and safety plan;
- Chemical hazards;
- Monitoring instruments and results of air monitoring; and
- Site specific equipment safety.

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Skinner Landfill Site Project No. 38335 Safety Training Log

Date: _____ Time: _____

Page 1 of 2

Briefing Conducted By:

Signature:

Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926 as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the completed documents at the facility for review for the duration of the project.

TOPICS COVERED:

- | | | |
|--|--|---|
| <input type="checkbox"/> General PPE Usage | <input type="checkbox"/> Site/Facility-specific Guidelines | <input type="checkbox"/> Emergency Procedures |
| <input type="checkbox"/> New Work Procedures | <input type="checkbox"/> Slips Trips and Falls | <input type="checkbox"/> Elevated Work Surfaces |
| <input type="checkbox"/> Personal Hygiene | <input type="checkbox"/> Heat/Cold Stress | <input type="checkbox"/> Construction Safety |
| <input type="checkbox"/> HAZCOM Issues | <input type="checkbox"/> Confined Space Entry | <input type="checkbox"/> Hearing Conservation |
| <input type="checkbox"/> Exposure Guidelines | <input type="checkbox"/> Severe Weather | <input type="checkbox"/> Other: _____ |

Personnel Information

Printed Name

Signature

Company Name

[illegible]

Date: _____ Time: _____

Personnel Information (continued)[illegible]

**Skinner Landfill Site
Project No. 38335
Safety Training Log**

Date: _____ Time: _____

Page 1 of

Briefing Conducted By:

Signature: _____

Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926, as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the complete documents at the facility for review for the duration of the project.

TOPICS COVERED:

- ☐ General PPE Usage
- ☐ New Work Procedures
- ☐ Personal Hygiene
- ☐ HAZCOM Issues
- ☐ Exposure Guidelines

- ☐ Site/Facility-specific Guidelines
- ☐ Slips Trips and Falls
- ☐ Heat/Cold Stress
- ☐ Confined Space Entry
- ☐ Severe Weather

- ☐ Emergency Procedures
- ☐ Elevated Work Surfaces
- ☐ Construction Safety
- ☐ Hearing Conservation
- ☐ Other:

Personnel Information

Printed Name

Signature

Company Name

Date: _____ Time: _____

Personnel Information (continued)

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a tyco INTERNATIONAL LTD COMPANY

**Skinner Landfill Site
Project No. 38335
Safety Training Log**

Date: _____ Time: _____

Page 1 of

| | | |
|------------------------|------------|---------------|
| Briefing Conducted By: | Signature: | Company Name: |
|------------------------|------------|---------------|

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926 as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the complete documents at the facility for review for the duration of the project.

TOPICS COVERED:

- | | | |
|--|--|---|
| <input type="checkbox"/> General PPE Usage | <input type="checkbox"/> Site/Facility-specific Guidelines | <input type="checkbox"/> Emergency Procedures |
| <input type="checkbox"/> New Work Procedures | <input type="checkbox"/> Slips Trips and Falls | <input type="checkbox"/> Elevated Work Surfaces |
| <input type="checkbox"/> Personal Hygiene | <input type="checkbox"/> Heat/Cold Stress | <input type="checkbox"/> Construction Safety |
| <input type="checkbox"/> HAZCOM Issues | <input type="checkbox"/> Confined Space Entry | <input type="checkbox"/> Hearing Conservation |
| <input type="checkbox"/> Exposure Guidelines | <input type="checkbox"/> Severe Weather | <input type="checkbox"/> Other: _____ |

Personnel Information

[illegible]

Date: _____ Time: _____

Personnel Information (continued)[illegible]

**Skinner Landfill Site
Project No. 38335
Safety Training Log**

Date: _____ Time: _____

Page 10

Briefing Conducted By:

Signature:

Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926, as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the complete set of documents at the facility for review for the duration of the project.

TOPICS COVERED:

- | | | |
|--|--|---|
| <input type="checkbox"/> General PPE Usage | <input type="checkbox"/> Site/Facility-specific Guidelines | <input type="checkbox"/> Emergency Procedures |
| <input type="checkbox"/> New Work Procedures | <input type="checkbox"/> Slips Trips and Falls | <input type="checkbox"/> Elevated Work Surfaces |
| <input type="checkbox"/> Personal Hygiene | <input type="checkbox"/> Heat/Cold Stress | <input type="checkbox"/> Construction Safety |
| <input type="checkbox"/> HAZCOM Issues | <input type="checkbox"/> Confined Space Entry | <input type="checkbox"/> Hearing Conservation |
| <input type="checkbox"/> Exposure Guidelines | <input type="checkbox"/> Severe Weather | <input type="checkbox"/> Other: _____ |

Personnel Information

Printed Name

Signature

Company Name



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Date: _____ Time: _____

Personnel Information (continued)[illegible]

**Skinner Landfill Site
Project No. 38335
Safety Training Log**

Date: _____ Time: _____

Page 1 of

Briefing Conducted By:

Signature:

Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926 well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the complete documents at the facility for review for the duration of the project.

TOPICS COVERED:

- | | | |
|--|--|---|
| <input type="checkbox"/> General PPE Usage | <input type="checkbox"/> Site/Facility-specific Guidelines | <input type="checkbox"/> Emergency Procedures |
| <input type="checkbox"/> New Work Procedures | <input type="checkbox"/> Slips Trips and Falls | <input type="checkbox"/> Elevated Work Surfaces |
| <input type="checkbox"/> Personal Hygiene | <input type="checkbox"/> Heat/Cold Stress | <input type="checkbox"/> Construction Safety |
| <input type="checkbox"/> HAZCOM Issues | <input type="checkbox"/> Confined Space Entry | <input type="checkbox"/> Hearing Conservation |
| <input type="checkbox"/> Exposure Guidelines | <input type="checkbox"/> Severe Weather | <input type="checkbox"/> Other: _____ |

Personnel Information

Printed Name

Signature

Company Name

[illegible]

Date: _____ Time: _____

Personnel Information (continued)[illegible]

Skinner Landfill Site Project No. 38335 Safety Training Log

Date: _____ Time: _____

Page 1 of

Briefing Conducted By:

Signature: _____

Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926, as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the complete set of documents at the facility for review for the duration of the project.

TOPICS COVERED:

- ☐ General PPE Usage
- ☐ New Work Procedures
- ☐ Personal Hygiene
- ☐ HAZCOM Issues
- ☐ Exposure Guidelines

- ☐ Site/Facility-specific Guidelines
- ☐ Slips Trips and Falls
- ☐ Heat/Cold Stress
- ☐ Confined Space Entry
- ☐ Severe Weather

- ☐ Emergency Procedures
- ☐ Elevated Work Surfaces
- ☐ Construction Safety
- ☐ Hearing Conservation
- ☐ Other: _____

Personnel Information

Printed Name

Signature

Company Name

Date: _____ Time: _____

Personnel Information (continued)[illegible]

HEALTH AND SAFETY PROCEDURES

SUBJECT:

Recordkeeping

NUMBER: 11

PAGE: 1 OF: 2

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

Records pertaining to health and safety are to be maintained by either the division office or at the corporate office.

2.0 PURPOSE

This procedure describes the minimum requirements for maintaining the required health and safety records.

3.0 REQUIREMENTS

3.1 The OSHA 200 log will be maintained by Corporate Health and Safety. A copy will be readily available at the Corporate home office.

3.2 Medical records will be kept by each division office and will include:

- Name and social security number of employee;
- Date of medical exam;
- Any employee medical complaints related to exposure;
- Physicians written opinions regarding the employee;
- A copy of any information provided to the physician by the employer; and
- Accident/Injury reports.

3.3 Training records will be kept at each division office in each person's personnel file and include:

- 40-hour initial training certification;
- Asbestos certification;
- First Aid/CPR;
- Forklift training;
- Respirator fit testing; and
- Refresher 8-hour training.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|--------------------------------|---------------|
| SUBJECT: Recordkeeping | NUMBER: 11 | PAGE: 2 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

- 3.4 Air sampling data and permits (hot work, confined space, line entry) will be kept in the project files
- 3.5 The project manager and site safety officer will review the records of each person prior to assignment of work involving hazardous materials and assure that the medical surveillance, training, and respirator fit tests are current.
- 3.6 All medical records are to be retained for the duration of employment and 30 years thereafter.
- 3.7 Should a division office close, the required records will be transferred to the corporate office.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

PERSONAL PROTECTIVE EQUIPMENT (PPE)

NUMBER: 12

PAGE: 1 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

All employees who may be exposed to hazardous substances will be provided with the necessary personal protective equipment.

2.0 PURPOSE

The purpose of this procedure is to describe the requirements for the selection and use of personal protective equipment (PPE).

3.0 GENERAL INFORMATION

- 3.1 The wearing of company-approved hard hats on job sites is mandatory. Hard hats will meet the specifications of ANSI 289.1 as required by OSHA.
- 3.2 Eye protection will be worn when machine or operations present potential eye injury from physical, chemical, or radiation agents. Eye and face protection required herein will meet the requirements specified in ANSI 287.1.
- 3.3 Face shields are to be worn when full-face protection is required from exposures similar to those listed under eye protection. Face shields are not substitutes for eye protection.
- 3.4 Ear plugs or muffs are to be used when exposed to injurious noise levels over extended periods of time. For specific requirements, see OSHA 1926.52.
- 3.5 Gloves are to be used when hands are exposed to sustained heat and sparks, wet concrete, acids, corrosives, electrical exposure, etc.
- 3.6 Chemical resistant, steel toe and shank boots are to be worn when working on all job sites.
- 3.7 Safety belts meeting the Federal OSHA standards will be worn by all employees exposed to falls from unprotected heights of 6 feet or more. Safety belt lanyards will be a minimum of 0.5-inch nylon or equivalent with a maximum length to provide for a fall no greater than 6 feet.
- 3.8 Life jackets and ring buoys are to be used where employees are working over or near water.
- 3.9 Flagmen vests are to be worn by employees flagging traffic or workers exposed to traffic.
- 3.10 Reflective belts are to be worn by all employees on foot around equipment at night.
- 3.11 Seat belts are to be installed and used in the front seats of passenger cars, pickups, and trucks. (Driver's seat only in hauling units where no riders are allowed. Use "NO RIDERS" decal.)

HEALTH AND SAFETY PROCEDURES

SUBJECT:

PERSONAL PROTECTIVE EQUIPMENT (PPE)

NUMBER: 12

PAGE: 2 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

3.12 Appropriate work clothing will be worn at all times to minimize the hazards from work:

- Shirts which cover the shoulders and torso (tee shirts are not acceptable). Shirts or alternate protection which cover the entire arm may be required in certain circumstances.
- Shorts are prohibited.
- Loose clothing or jewelry which may catch or become entangled with equipment is prohibited.

4.0 LEVELS OF PROTECTION

4.1 The level of protection will be specified in all project health and safety plans. Personal protective equipment has been divided into four categories based on the degree of protection afforded.

4.2 Level A

Level A protection must be used when the highest level of skin, eye, and respiratory is required based on measured levels or potential for high concentrations of atmospheres vapors, gases or particulates, or when a high potential for skin contact with harmful materials exists. Level A equipment includes:

- Pressure - demand (positive pressure) full-face self-contained breathing apparatus (SCBA) or airline respirator with escape SCBA;
- Totally encapsulating chemical-protective suit;
- Hard hat;
- Gloves - outer and inner, chemical resistant;
- Boots - chemical resistant, steel toe, and shank; and
- Two-way radio (worn inside suit).

4.3 Level B

Level B protection must be used when the highest level of respiratory protection is required (as in Level A), but a lesser degree of skin protection is required. Level B equipment includes:

HEALTH AND SAFETY PROCEDURES

SUBJECT:

PERSONAL PROTECTIVE EQUIPMENT (PPE)

NUMBER: 12

PAGE: 3 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

- Pressure - demand (positive pressure) full-face SCBA or airline respirator with escape SCBA;
- Hooded, chemical resistant clothing, such as one or two piece splash suit or disposable chemical resistant coveralls;
- Gloves - outer and inner, chemical resistant;
- Boots - chemical resistant, steel toe, and shank;
- Hard hat; and
- Two-way radio.

4.4 Level C

Level C protection must be worn when the airborne contaminants are known and the criteria for using air purifying respiratory is met. Level C equipment includes:

- Full-face or half-mask air purifying respirators with cartridges approved for the type of exposures likely to be encountered;
- Hooded, chemical resistant clothing such as overalls, and long-sleeved jacket, one or two piece splash suit or disposable, chemical resistant coveralls;
- Gloves - outer and inner, chemical resistant;
- Boots - chemical resistant, steel toe, and shank;
- Hard hat; and
- Two-way radio.

4.5 Level D

Level D is the basic work uniform that will be used. It provides only minimal protection. Level D equipment, used as appropriate, includes:

- Coveralls;
- Boots - chemical resistant, steel toe, and shank;
- Gloves;

HEALTH AND SAFETY PROCEDURES

SUBJECT:

PERSONAL PROTECTIVE EQUIPMENT (PPE)

NUMBER: 12

PAGE: 4 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

- Safety glasses; and

- Hard hat.

4.6 The specific equipment requirements within a given level of protection may be modified as necessary to suit the particular needs of a project. However, the requirements for Level A to D, as specified in Sections 4.2 through 4.5, above, will be retained as minimum requirements.

4.7 The level of protection may be upgraded or downgraded by the site safety officer as conditions change at the site.

Reasons to upgrade include:

- Change in work task that will increase contact or potential contact with hazardous materials;
- Action level is detected during monitoring; and/or
- Request of the individual employee.

Reasons to downgrade include:

- New information indicates the situation is less hazardous than originally believed;
- Change in site conditions that decreases the hazards;
- Change in work task that will reduce contact with hazardous materials; and/or
- Monitoring or lab analysis support a decision to downgrade.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|---------------------------------|---------------|
| SUBJECT: RESPIRATORY PROTECTION - EXCEPT SCBA | NUMBER: 13 | PAGE: 1 OF: 4 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

1.0 POLICY

No individual will enter an area where respiratory protective equipment is required unless the person has been trained in the selection, use, care and limitations of the respirator, and the proper respirator has been selected for the task.

2.0 PURPOSE

This procedure provides managers and employees with requirements in the selection, use, care, and limitations of respiratory protective equipment.

3.0 SCOPE

This procedure applies to all types of respiratory protective equipment except SCBA.

4.0 GENERAL REQUIREMENTS

4.1 Whenever respirators are required, only equipment approved for that purpose will be used. This equipment must be approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH). Only parts approved for the specific respirator system are to be used for replacement. Modifications to respirators are not allowed unless authorized by the approved agency. Only a person specifically trained should perform work on respirators.

4.2 Proper selection of respirators is to be made according to guidance provided by ANSI standard Z88.2-1980. The correct respirator is to be specified for each job. Site health and safety plans, as part of the level of protection requirements, will specify the type of respirator to be used.

The hazardous site is also constantly monitored to detect any changes in the working conditions. This procedure allows site safety officers to choose the correct type of respirator in any given situation. EARTH TECH site safety officers periodically monitor the level of contamination in the work area. They determine the amount of exposure the employees face and the acceptable level for each employee. Direct reading instruments are used to make sure the proper respirator is selected.

4.3 Any employee issued a respirator will be provided training in the selection, use, care, and limitations of the respirator, including the provisions of this procedure. Additionally, anyone using a negative pressure respirator will receive a fit test at least annually. The fit test will be qualitative, although for certain projects, a quantitative fit test will be required as designated by the site safety plan.

After the respirator fitting test has been completed, employees will be issued and must keep a record of the test results. The following information must be recorded: the type of test

HEALTH AND SAFETY PROCEDURES

| | | |
|--|---------------------------------|---------------|
| SUBJECT: RESPIRATORY PROTECTION - EXCEPT SCBA | NUMBER: 13 | PAGE: 2 OF: 4 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

administered, type of respirator used, name of employee tested, name of employee giving the test, date, and test results.

- 4.4 Respirators are to be inspected by the user before each use and not worn if defective or if conditions prevent a gas tight face to facepiece seal. Each part of the respirator must be examined. Check for cuts, holes, stiffening, or crushing of the facepiece. The headbands must not have any breaks, tears, bent or missing hardware, or loss of elasticity. The inhalation and exhalation valve system must be checked for dust or dirt on valve flap. No tears or cracks may exist in the valve itself.
- 4.5 Employees may not wear facial hair that interferes with a good gas-tight face seal. Other conditions which could interfere with a good face seal include wearing of glasses under full-face respirators, absent teeth or dentures, or unusual face configurations.
- 4.6 Contact lenses are not to be worn in an atmosphere requiring a respirator. Eyeglass kits for prescription lenses in a full-face respirator will be provided by EARTH TECH.
- 4.7 All breathing air used for supplied air respirators must be grade D or better as described by the Compressed Gas Association Specification G-7.1-1973. The breathing air supply must be equipped with necessary safety items including alarms to indicate low air pressure. If an oil lubricated compressor is used, an additional alarm to indicate over temperature or carbon monoxide buildup must be used. Air line couplings associated with breathing air must be incompatible with outlets for other gas systems.
- 4.8 Persons will not be assigned tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work while using the respiratory equipment. A physician with sufficient knowledge of respiratory protection will determine what health and physical conditions are pertinent. The medical status of persons assigned to use respirators will be reviewed annually.
- 4.9 Respiratory equipment will be cleaned, inspected, and sanitized after each use by the user or site person assigned to decontamination. When not in use, respirators are to be stored to protect against dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals.
- 4.10 Cleaning will be accomplished in four steps:

4.10.1 Washing

The respirator should be washed in warm water about 140°F with a good detergent using a soft brush. Insert all valves and headband.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

RESPIRATORY PROTECTION - EXCEPT SCBA

NUMBER: 13

PAGE: 3 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

4.10.2 Rinsing

4.10.3 Disinfecting

Disinfecting rinse consisting of two tablespoons chlorine bleach added to a gallon of water.

4.10.4 Rinsing

After disinfecting, the respirator will be rinsed in clean, warm water. All traces of detergent and disinfectant must be removed.

4.10.5 Drying

Allow respirator to air dry by hanging or placing on a clean surface. If it is not possible to air dry, then towel dry before bagging. When dry, assemble the respirator, and store in a clean poly bag.

- 4.11 An evaluation of the respiratory protection program's effectiveness should take place at least once a year. Improvements and modifications needed to correct any program deficiencies or meet additional needs should be accomplished. The program evaluation considers wearer acceptance of the respirator, additional inspection of the program in action, and appraisal of the protection provided to employees.

5.0 SPECIFIC RESPIRATORS

5.1 Air purifying -- General Information

Air purifying respirators provide clean air to the wearer by passing atmospheric air through a filtering element. Because most air purifying respirators are also negative pressure (the driving force for air movement is the users inhalation, creating a negative pressure inside the mask), any leakage around the sealing surface of the respirator will be directed inward. These air purifying respirators offer a lower level of protection than air supplied respirators. Air purifying respirators are never to be worn in oxygen deficient atmospheres (less than 20.8 percent oxygen). Air purifying respirators are not to be worn when the airborne contaminant does not possess adequate warning properties (i.e., odor) to warn the user of cartridge breakthrough. Air purifying respirators may be either a half-facepiece or full-facepiece style.

5.2 Air Purifying -- Cartridge Type

A variety of cartridges exist for air purifying respirators. The specific one used depends on the type of contaminant being protected against. The site health and safety plan will specify which cartridge is to be used. Common cartridges available include organic vapors, acid gases, ammonia, and various combinations of the above. Furthermore, particulates can be

HEALTH AND SAFETY PROCEDURES

SUBJECT:

RESPIRATORY PROTECTION - EXCEPT SCBA

NUMBER: 13

PAGE: 4 OF: 4

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

filtered as well, often in combination with gas and vapor protection. Some materials require use of a High Efficiency Particulate Aerosol (HEPA) filter.

5.3 Disposable Air Purifying Respirators

Disposable (paper) respirators do not protect against gases or vapors. Due to the uncertainty involved in fitting a paper mask, these respirators are not to be used except for nuisance-type dusts.

5.4 Air Supplied Respirators -- SCBA

A SCBA provides the highest level of protection of any respirator. SCBAs are addressed in greater detail in a separate Health and Safety Procedure.

5.5 Air Supplied Respirators -- Airline Respirators with Escape Pack

In some cases, an airline respirator with an emergency escape pack may be used instead of an SCBA. This unit consists of a pressure demand airline respirator connected to a source of breathing air combined with a 5-minute air bottle unit to allow escape if the source of breathing air fails.

5.6 Airline respirators in the continuous flow mode are not approved for Immediately Dangerous to Life and Health (IDLH) or oxygen deficient atmospheres. However, they do provide a higher level of protection than air purifying respirators because facepiece leakage tends to be outward. Prior to use, alarms and any air filters must be checked. Supplied air must be grade D or better. Hose length must be limited to 250 feet for Survivair, but it is recommended that 50 feet be the maximum hose length. The airline hose may constitute a safety problem if activities such as ladder climbing are required.

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FIT TEST RECORD

| | |
|-----------------------------|---|
| GENERAL INFORMATION | |
| Employee Name: | Date of Fit Test: |
| Employee Number: | Employee Section Number: |
| Person Performing Fit Test: | Signature (person performing fit test): |

| | |
|---|------------------------|
| RESPIRATOR SELECTION | |
| Respirator Manufacturer: | Respirator Model/Size: |
| Respirator Type: | |
| <input type="checkbox"/> Full-face, dual cartridge <input type="checkbox"/> Half-face, dual cartridge <input type="checkbox"/> Other: _____ | |

| | | | |
|--|--|------------------------------------|---------------------------------------|
| FIT TEST RESULTS | | | |
| Positive/Negative Pressure Check: <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| Fit Test Method: | | | |
| <input type="checkbox"/> Irritant Smoke | <input type="checkbox"/> Isoamyl Acetate | <input type="checkbox"/> Saccharin | <input type="checkbox"/> Other: _____ |
| Fit Test Results: | | | |
| <input type="checkbox"/> Pass | | <input type="checkbox"/> Fail | |

| |
|-----------------|
| COMMENTS |
| |

Rainbow Passage (per 29 CFR 1910.134)

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but not one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.



HEALTH AND SAFETY PROCEDURES

SUBJECT:

SELF-CONTAINED BREATHING APPARATUS (SCBA)

NUMBER: 14

PAGE: 1 OF: 2

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

A Self-Contained Breathing Apparatus (SCBA) is approved for IDLH or oxygen deficient (less than 20.8 percent) situations.

2.0 PURPOSE

This procedure provides project managers and employees with the requirements in the use, care, and limitations of SCBAs.

3.0 SCOPE

This procedure applies only to use of SCBAs.

4.0 PROCEDURE

4.1 SCBAs are to be used whenever level A or B protection is required, whenever the site health and safety officer requires their use, or whenever the hazards of a situation cannot be assessed prior to entry.

4.1.1 Exceptions based upon site conditions may be granted where an airline respirator with escape pack system has been approved by the site safety officer.

4.2 Only SCBAs operating in the positive pressure (pressure demand) mode will be used.

4.3 No individual will use an SCBA until training on the use, care and limitations of the SCBA has been received. Such training will be received at least annually.

4.4 SCBAs are to be inspected by the user prior to use to ensure the cylinder is fully charged, the regulator and warning devices operate properly, and that the harness, facepiece, hoses, and head straps are in good condition.

4.5 SCBAs are not to be used if the tank is not fully charged or if any other condition exists which could cause failure of the unit during use.

4.6 When using an SCBA, users will leave the work area promptly when the low air pressure alarm signal sounds.

4.7 Individuals are not to make repairs or modifications to an SCBA unless specifically authorized by the manufacturer of the unit and the site safety officer.

4.8 The Site Safety Officer is responsible for maintaining the SCBAs ready for use at all times. This includes performing the monthly inspections and inspecting, sanitizing, and refilling or replacing the air tanks after each use.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|---------------------------------|---------------|
| SUBJECT: SELF-CONTAINED BREATHING APPARATUS (SCBA) | NUMBER: 14 | PAGE: 2 OF: 2 |
| | DATE PUBLISHED: October 2, 1992 | |
| | DATE REVISED: May 3, 1994 | |

- 4.9 Monthly inspections are to include checks on tightness of connections and the condition of the headbands, valves, and connecting tubes. Rubber parts are to be inspected for pliability and deterioration. The air tank must be fully charged and the hydrotest certification must be correct. Regulator and warning devices must function properly. A record of inspection dates is to be maintained on the SCBA or in its storage container and must include the inspector's name, date of inspection, and identification number of the SCBA. The inspection checklists are to be kept with the SCBA for reference. The checklist is shown following this procedure.
- 4.10 Any deficiency noted during inspection requires removing the SCBA from service until the condition is corrected. The SCBA and the storage case must be clearly marked or tagged "OUT OF SERVICE."
- 4.11 SCBAs are not to be worn if conditions prevent a gas tight face to facepiece seal. Employees may not wear facial hair that interferes with a gas tight face seal. Other conditions which could interfere with a face seal include wearing of glasses, absent teeth or dentures, or unusual face configurations.
- 4.12 Contact lenses are not to be worn in an atmosphere requiring an SCBA. Eyeglass kits for prescription lenses are provided by EARTH TECH.
- 4.13 Persons will not be assigned tasks requiring the use of an SCBA unless it has been determined that they are physically able to perform the work while wearing the SCBA. A physician with sufficient knowledge of respiratory protection will determine what health and physical conditions are pertinent. The medical status of persons assigned to use SCBAs will be reviewed annually.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

Work Zones

NUMBER: 15

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

All job sites involving hazardous materials will be divided into 3 well delineated work zones.

2.0 PURPOSE

The purpose of this procedure is to describe the requirements for establishing work zones on job sites involving hazardous materials.

3.0 EXCLUSION ZONE

- 3.1 This is an area where contamination can or could occur. This zone has the highest inhalation exposure potential and may present a high probability of chemical contact with skin.
- 3.2 Activities in the exclusion zone include site characterization (mapping, sampling), installation of monitoring wells and all cleanup or remediation work.
- 3.3 The outer boundary is based on initial data evaluations and distances required for safety operations.
- 3.4 The outer border should be clearly marked by the use of physical barriers such as fences or barrier tape and proper warning signs and labels.

4.0 CONTAMINATION REDUCTION ZONE

- 4.1 This is the area immediately adjacent to exclusion zone and serves as a transition between the contaminated and clean areas.
- 4.2 Activities in the contamination reduction zones include decontamination, equipment resupply (air tanks, protective equipment, sampling equipment, etc.), sample packaging, and worker temporary rest area.
- 4.3 All exits from exclusion zone must proceed through the decontamination area, except in emergencies.

5.0 SUPPORT ZONE

- 5.1 This area should contain no contamination and is located outside of the contamination reduction zone. Exposure to chemicals is unlikely. No protective equipment is required.
- 5.2 The support zone should be located upwind of the exclusion zone.
- 5.3 Activities in this area include the command post, equipment storage, administrative activities, and field laboratory.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

DECONTAMINATION

NUMBER: 16

PAGE: 1 OF: 1

DATE PUBLISHED: October 2, 1992

DATE REVISED: May 3, 1994

1.0 POLICY

All personnel working on job sites involving hazardous materials require decontamination upon leaving the exclusion zone.

2.0 PURPOSE

The purpose of this procedure is to describe the requirements for decontamination.

3.0 REQUIREMENTS

- 3.1 Site-safety plans will include a section on decontamination with specific requirements.
- 3.2 Every exit from the exclusion zone requires decontamination. The exception is an emergency situation. If an employee is injured, decontaminate to the extent possible given the nature of the injury.
- 3.3 Large equipment such as drill rigs will be decontaminated by using a steam or hot water hose wash or by detergent wash.
- 3.4 The procedure will vary from site to site but will always include the following steps
 - Equipment drop;
 - Outer boots and glove wash/rinse (step off);
 - Outer boots and gloves removal;
 - Suit wash/rinse/removal;
 - Inner glove wash/rinse;
 - Face piece removal, wash/rinse;
 - Inner glove removal; and
 - Field wash (face, hands).
- 3.5 Personnel assigned to the decontamination process will assist workers and decontaminate equipment and reusable protective gear.
- 3.6 An on-site shower facility will be provided whenever necessary.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEAT STRESS

NUMBER: 17

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

1.0 POLICY

Project supervision is to be aware of the symptoms and causes of heat-related illnesses and take appropriate steps to prevent their occurrence.

2.0 PURPOSE

This procedure describes the causes, symptoms, treatment, and/or prevention of heat-related illness.

3.0 GENERAL INFORMATION

- 3.1 Heat-related illnesses are generally caused by the body's inability to remove metabolic heat while being exposed to excessive environmental heat.
- 3.2 A period of adjustment or acclimatization is necessary before maximum tolerance to heat is acquired. Most workers require 7 to 10 working days of gradually increasing workload to become fully acclimatized.
- 3.3 The body's core temperature must be maintained below 100 degrees Fahrenheit or else heat stress can occur.
- 3.4 Pulse rate is another good indicator of heat stress. The pulse rate after one minute of recovery should be less than 110 beats per minute.
- 3.5 Heat-related illnesses are caused by the loss of water and electrolytes.

4.0 HEAT-RELATED ILLNESSES

- 4.1 Heat rash can be caused by continuous exposure to hot and humid air.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

- 4.2 Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement.

Signs and symptoms: Muscle spasm and pain in the extremities and abdomen.

Treatment: Remove affected person to a cool place and give sips of salted water (1 teaspoon of salt to 1 quart of water). The salted water should quickly mitigate the cramps. Manual pressure may also be applied to the cramped muscles.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEAT STRESS

NUMBER: 17

PAGE: 2 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- 4.3 Heat exhaustion is a mild form of shock caused by sustained physical activity in heat and profuse perspiration without adequate fluid and salt replacement.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist (clammy) skin; profuse sweating; dizziness; fatigue.

Treatment: Remove affected person to a cool place and remove as much clothing as possible. Give sips of salted water and fan the person continually to remove heat by convection. CAUTION: Do not allow the affected person to become chilled -- treat for shock if necessary.

- 4.4 Heatstroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death.

Signs and Symptoms: Red, hot, dry, skin; body temperature of 105 degrees Fahrenheit or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If convulsions develop, prevent victim from biting his tongue. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in an ice/water bath (however, be careful not to over chill the victim once body temperature is reduced below 102 degrees Fahrenheit). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5.0 SPECIFIC REQUIREMENTS

- 5.1 A section of site-safety plans will address heat stress if the ambient temperature is expected to exceed 70 degrees Fahrenheit.
- 5.2 The site-safety plan will discuss work-rest cycles and provisions for monitoring the level of heat stress (i.e., pulse rate).
- 5.3 Workers are to be advised not to drink caffeinated or alcoholic beverages because they increase the rate of body water loss.
- 5.4 Increase dietary salt or lightly salted (0.2 percent) water is adequate to replace lost salt. Salt tablets are not to be used.
- 5.5 If juice or electrolyte drinks are used, they should be diluted prior to drinking.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEAT STRESS

NUMBER: 17

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- 5.6 Thirst is not an adequate indicator of body water loss. Workers are to drink at least small amounts of water on each break.
- 5.7 Workers are to rest when any of the symptoms described above are present. The buddy system is mandatory, as most often the potential victim will not be aware of any symptoms. Watch out for each other.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONFINED SPACE ENTRY

NUMBER: 18

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

1.0 POLICY

No employee is to enter a confined space until atmospheric testing has been conducted and a confined space entry permit has been completed. Confined space permits are valid for a single work shift only, unless conditions do not change on a daily basis. Employees will be trained per the requirements of the OSHA Confined Space Standard 29 CFR 1910.146 prior to entry.

2.0 PURPOSE

This procedure provides personnel with requirements for working safely in confined spaces.

3.0 DEFINITIONS

- 3.1 Confined Space - Any enclosed area having a limited means of egress where ventilation is not adequate to remove a toxic or flammable atmosphere or oxygen deficiency which may exist. Examples of confined spaces include, but are not limited to: tanks, vessels, bins, boilers, ducts, skewers, underground utility vaults, manholes, tunnels, pipelines, or any open top space more than 4 feet in depth such as pits, tubes, vaults, or vessels.
- 3.2 Oxygen Deficiency - Atmospheres which contain less than 19.5 percent oxygen.
- 3.3 Flammable Atmosphere - Atmospheres in excess of 10 percent of the lower flammable limit of the material in question. These are often toxic as well as flammable.
- 3.4 Toxic Atmosphere - Atmospheres having concentrations of airborne chemicals in excess of permissible exposure limits as defined by Federal or state regulations or Threshold Limit Values (TLVs).
- 3.5 IDLH - Immediately Dangerous to Life or Health conditions (e.g., oxygen deficiency, unknowns, elevated toxics, etc.)

4.0 PROCEDURE

- 4.1 A confined space entry permit containing the applicable elements of this section will be written and approved prior to any entry into a confined space.
- 4.2 The confined space is to be emptied, flushed, or otherwise purged of hazardous substances.
- 4.3 Pipes or lines which convey any kind of substance to the confined space are to be disconnected, blinded, or have the valve locked off to prevent such substances from entering the confined space while work is in progress.
- 4.4 Electrical circuits to fixed mechanical equipment which may cause injury if accidentally energized must be de-energized and locked out.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONFINED SPACE ENTRY

NUMBER: 18

PAGE: 2 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- 4.5 The air in the confined space is to be tested for oxygen deficiency, flammable atmosphere, and any toxic contaminants likely to be present. All tests of the atmosphere are to be made by trained, competent personnel using calibrated equipment.
- 4.6 Electrical equipment and lighting are to be explosion proof when used in confined spaces subject to flammable or explosive gases, vapors, or dusts. Extreme care must be taken in dusty atmospheres because there may be no indication of problems on atmospheric test equipment, yet hazards may exist. Power tools should be pneumatic when possible.
- 4.7 All work will stop and the confined space evacuated if any indication of ill effect such as dizziness, irritation, or excessive odors are noted.
- 4.8 Welding and/or cutting in a confined space shall require the use of a hot-work permit. Cutting gas cylinders and welding machines will not be taken into confined spaces.
- 4.9 All employees entering a confined space shall wear and/or have available an approved safety harness and/or rope. When the confined space is entered through a manhole or is deeper than the employee's shoulders, an approved life line should be attached. When the nature of the space entered involves more than one employee and the fouling of life lines could occur, the Safety Department should be consulted.
- 4.10 Rescue equipment must be at the project site prior to commencing work. Rescue equipment will include extra rope, safety harnesses, stretchers, and emergency SCBA and/or source of oxygen. No one should enter a confined space until adequate safety equipment is present to remove an unconscious person.
- 4.11 A ladder is required in all confined spaces deeper than the employees' shoulders. The ladder shall be secured and not removed until all employees have exited the space.
- 4.12 The project supervisor is responsible for evaluating general safety hazards including permits, locking out of equipment, adequate lighting, tools, etc., and is responsible for assuring the confined space entry permit is completed.
- 4.13 Confined space entry permits will be maintained in the project file.
- 4.14 A copy of the confined space entry permit follows this procedure.

5.0 CONFINED SPACE ENTRY PROCEDURES FOR SAFETY OBSERVER

Employees entering a confined space must be under the constant surveillance of a safety observer. It is the safety observer's responsibility to follow this procedure:

- A valid confined space entry permit must be at the site.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONFINED SPACE ENTRY

NUMBER: 18

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 3, 1994

- Rescue equipment must be available at the site.
- The safety observer must know the location of the nearest telephone and emergency numbers, safety shower, and fire extinguishers.
- When welding or cutting is done in a confined space, the safety observer must know how to shut down the equipment.
- The safety observer must remain in constant contact with the employees in the confined space. The observer is not to leave his/her assigned station space except to report an emergency.

- INFORMS/SOP/CSE.18

**EARTH TECH
CONFINED SPACE ENTRY PERMIT**

Permit No. _____

Good on this date only: _____ From: _____ AM/PM To: _____ AM/PM

Location: _____ Project No.: _____

| | | |
|---------------------------|----------------|----------------|
| Workers Authorized Entry: | Work Monitors: | Work Monitors: |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

Description of job or special procedures: _____

Employee Training and Pre-Entry Briefing

1. Safe Entry and Rescue Training conducted on: _____ (Date)
2. Mandatory Pre-Entry Briefing conducted on: _____ (Date)
3. Does this job require special training? _____ Yes _____ No

Contractor Notification

Contractor notified of: Permit Conditions _____ Potential Hazards _____ N/A _____

| | | |
|-----------------------|-------------------------|-----------------------|
| Lighting Requirements | Special Tools/Equipment | Communication Devices |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

- | | | | |
|--|-----------|----------|--|
| 1. Are all electrical devices intrinsically safe? | _____ Yes | _____ No | |
| 2. Have all power cords and tools been visually inspected? | _____ Yes | _____ No | |

Vessel Preparation

- | | | | |
|--|-----------|----------|--|
| 1. Work area isolated with signs/barriers? | _____ Yes | _____ No | |
| 2. All energy sources locked/tagged out? | _____ Yes | _____ No | |
| 3. All input lines capped/blinded? | _____ Yes | _____ No | |
| 4. Vessel contents drained/flushed/neutralized? | _____ Yes | _____ No | |
| 5. Vessel cleaned/purged? | _____ Yes | _____ No | |
| 6. Ventilation provided 30 minutes before entry? | _____ Yes | _____ No | |

Pre-Entry Atmospheric Testing

| | | | |
|--------------------------------------|------------------------------|-------|-----------|
| | Reading: | Time: | Initials: |
| 1. Test for oxygen content: | _____ % O ₂ | _____ | _____ |
| 2. Test for flammable concentration: | _____ % LEL | _____ | _____ |
| 3. Test for toxic concentration: | _____ ppm of (TLV=) | _____ | _____ |
| 4. Test for heat stress hazard: | _____ °F _____ °C _____ WBGT | _____ | _____ |

Emergency/Rescue Procedures

1. Location of written emergency/rescue plan: _____
2. Type of emergency/rescue team required: On-site _____ Off-site _____ Phone No. _____

Safety Equipment

| | |
|---|---------------------------------|
| Personal Protective Equipment Required: | Area Safety Equipment Required: |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

- | | | | |
|---|-----------|----------|-------------|
| 1. Self-Contained Breathing Apparatus required? | _____ Yes | _____ No | Type: _____ |
| 2. Portable Atmospheric Monitor required? | _____ Yes | _____ No | Type: _____ |

Permit Authorization

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Permit authorized by (Signature): _____

HEALTH AND SAFETY PROCEDURES

SUBJECT:

LINE ENTRY

NUMBER: 19

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 5, 1994

1.0 POLICY

No employee is to break into a line until a line entry permit has been completed. The line entry permit is valid for a single work shift only.

2.0 PURPOSE

This procedure provides requirements for breaking into lines which contain or may contain hazardous materials.

3.0 PROCEDURE -- PRE-ENTRY

- 3.1 Prior to beginning operations at a site, the potential hazards associated with line entry will be recognized and addressed.
- 3.2 Each line should be regarded as potentially full and pressurized with a toxic, flammable product until it is proven otherwise. Safe line entry requires investigation and pre-planning before work begins.
- 3.3 It is critical to determine the line contents to assess the product's toxic and flammable properties.
 - Trace line to each end. For example, identify the pipe run between tanks or reactors.
 - Check for color coding. Many plants designate line contents by their own color-coding system. Do not assume one plant's code is the same as another or consistent within each plant.
 - If necessary, sample line contents.
- 3.4 Scaffolding or mainlifts used for elevated piping must be used according to manufacturer's specifications. Guardrails and tieoffs must be used.
- 3.5 Portable lighting must be provided if area is not sufficiently illuminated.
- 3.6 Any electrical lines near the work area must be de-energized prior to beginning operations. All electrical circuits are to be locked out.
- 3.7 Establish the level of protection (personal protective equipment) needed for the job, as well as any decontamination, secondary containment or spill response procedures.

4.0 PROCEDURE -- LINE BREAKING

- 4.1 Isolate the line by closing, locking, and tagging all valves entering the line.

HEALTH AND SAFETY PROCEDURES

| | | |
|----------------------------|--------------------------------|---------------|
| SUBJECT: LINE ENTRY | NUMBER: 19 | PAGE: 2 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

- 4.2 Lock and tag all electrical systems for pumps and automatic valves contained in the pipe run to be entered.
- 4.3 Remove all free product by pumping or draining. Inert or purge if applicable.
- 4.4 Blank or disconnect Line -- Install some physical barrier to prevent additional product from entering the system.
 - 4.4.1 Insert a blank or blind in a line to block it completely. This is important since valves should not be considered trustworthy. Valves have been known to leak even when fully closed.
 - 4.4.2 Make use of double block and bleed (two closed valves within close proximity of each other with an open drain line between), if available.
- 4.5 Prepare for Line Entry
 - 4.5.1 Establish exclusion zone. Zone should be sufficiently large to prevent unprepared people from contacting line material from liquid splash or vapor/gas emission.
 - 4.5.2 Stage appropriate spill-control media at site.
 - 4.5.3 Establish fire watch if necessary.
 - 4.5.4 Review level of personal protective equipment (e.g., respirator, clothing, gloves, and eye protection).
 - 4.5.5 Conduct air monitoring, including perimeter monitoring, for possible releases and explosive atmosphere survey or work area.
 - 4.5.6 Stage appropriate working surface (e.g., ladder, scaffold, mainlift, etc.)
- 4.6 Enter the Line
 - 4.6.1 Best place to enter a line is at a flange.
 - 4.6.2 Use nonsparking tools, such as brass, to loosen flange bolts if dealing with a flammable material.
 - 4.6.3 Slowly loosen top flange bolts first. This will relieve pressure if any. If the line still contains fluid, the material will be noted as dripping or welling around the flange. If these conditions are noted, retighten and recheck purge procedures.

HEALTH AND SAFETY PROCEDURES

| | | |
|----------------------------|--------------------------------|---------------|
| SUBJECT: LINE ENTRY | NUMBER: 19 | PAGE: 3 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

- 4.6.4 Because of possible leaks, no one will stand adjacent to or under a flange when opening.
- 4.7 The project supervisor is responsible for evaluating all safety hazards and assuring that the line entry permit is properly completed.
- 4.8 Line entry permits will be maintained in the project file.
- 4.9 A copy of the line entry permit follows this procedure.

FORMS/SOP/LE 19

LINE BREAKING PERMIT
(Good for One Work Shift Only)

A)

| | | | |
|----------------------------|------|----|-------|
| Date | Time | To | AM/PM |
| Location | | | |
| Line of Equipment | | | |
| Potential Chemical Hazards | | | |

B) Safety Precautions

| | | | | | |
|-----|--|-----|--|---------------|--|
| 1) | All emergency equipment in position? | Yes | | No | |
| 2) | Lines drained, purged and/or washed clean of material? | Yes | | Not Necessary | |
| 3) | All valves checked for positioning and tagged? | Yes | | Not Necessary | |
| 4) | All electrical equipment locked out and tagged? | Yes | | Not Necessary | |
| 5) | Fire watch designated? | Yes | | Not Necessary | |
| 6) | Exclusion zone roped off and signs posted? | Yes | | Not Necessary | |
| 7) | Personnel wearing adequate personal protective equipment for expected hazard (consult site safety plan)? | Yes | | Not Necessary | |
| 8) | LEL survey completed? | Yes | | Not Necessary | |
| 9) | Air monitoring equipment for poisonous/toxic substance available? | Yes | | Not Necessary | |
| 10) | Decontamination, spill response equipment and procedures established, in place, and ready for response? | Yes | | Not Necessary | |
| 11) | All personnel briefed on procedures? | Yes | | Not Necessary | |

I certify that all necessary precautions have been taken in accordance with the line breaking procedures.

Supervisor _____

Foreman _____

Site Safety Officer _____

Line Breaking Crew _____

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------|--------------------------------|---------------|
| SUBJECT: HOT WORK | NUMBER: 20 | PAGE: 1 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

1.0 POLICY

No work involving a flame- or spark-producing operations is to be conducted without preparing a hot work permit and following the provisions of this procedure.

2.0 PURPOSE

This procedure establishes requirements for cutting or burning operations.

3.0 REQUIREMENTS

- 3.1 The site safety officer is to ensure the hot work permit for any flame- or spark-producing operation. This procedure is to be conducted daily whenever such operations occur.
- 3.2 This procedure is to be read and complied with by any employee conducting hot work.
- 3.3 The EARTH TECH site supervisor or site safety officer will complete the following procedures prior to beginning hot work:
 - 3.3.1 Conduct a visual inspection of area. Remove any combustible material surrounding the work area. Special attention will be paid to area where hot slag can fall or spatter. Any combustible material which cannot be readily removed will be covered or otherwise protected from the hot materials. For example, covering a combustible surface with 1 inch of soil or wetting it may be sufficient.
 - 3.3.2 Designate a fire watch. This person's sole responsibility will be to monitor the welding or burning operation and have sufficient size and type for the potential combustible material. In addition, this person shall be trained in the proper use of the appropriate fire extinguisher and be knowledgeable of the emergency signal and evacuation procedures as well as emergency shut down procedures.
 - 3.3.3 Do not begin until all spaces, pipes, and sumps have been opened and tested for the presence of flammables. If any flammable or combustible vapors exceed 10 percent lower explosive limits (LEL), no work will begin until levels are reduced. As a rule, no hot work will begin when any combustible vapor is present.
 - 3.3.4 Personnel working in the area of the hot work will be alerted to the fact that hot work is taking place.
 - 3.3.5 A hot work permit will be completed and posted.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------|--------------------------------|---------------|
| SUBJECT: HOT WORK | NUMBER: 20 | PAGE: 2 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

4.0 BURNING OPERATION SAFETY RULES

- 4.1 Wear adequate flame and heat-resistant apparel and appropriate eye protection. This includes chipping operations.
- 4.2 Ensure that the area below is roped off and posted if work is overhead.
- 4.3 Protect personnel and equipment in near vicinity against exposure from arc or sparks.
- 4.4 Observe good housekeeping practices; keep excess hoses, cables, and equipment out of aisle ways, stairways, and your work station.
- 4.5 Never use oil, grease, or pipe fitting compounds to make up connections on oxy-acetylene welding equipment.
- 4.6 Store fittings in the manner to prevent contamination.
- 4.7 Do not interchange oxygen and acetylene hoses; oxygen is coded green and acetylene is coded red.
- 4.8 Do not force connections or strike or force valve wheels.
 - 4.8.1 Before connecting cylinders, read the label to ensure that the proper gas is being used.
 - 4.8.2 Cylinders must not be placed where they might form part of an electrical circuit. Keep cylinders away from grating, layout tables, and piping systems that may be used for ground of electrical welding circuits.
- 4.9 Open oxygen valves momentarily to remove dust or dirt; stand on one side of the valve and avoid contact of gas with any combustible material.
 - 4.9.1 Pressure-adjusting screws on regulators will be fully released before the regulator is attached to a cylinder and the cylinder valve opened. Open the cylinder valves slowly; stand to one side, not in front of pressure regulator gauge faces when opening cylinder valves.
 - 4.9.2 Do not use adjustable wrenches on acetylene cylinders; use the T-wrench provided. Keep it in place at the cylinder.
 - 4.9.3 Never open an acetylene cylinder valve more than one and one half turns.
- 4.10 Do not store tools or equipment in the recessed top of an acetylene cylinder, and do not allow water to accumulate there.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------|--------------------------------|---------------|
| SUBJECT: HOT WORK | NUMBER: 20 | PAGE: 3 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

- 4.11 Inspect the welding hose for defects before each use. Keep hoses clear of equipment and hot slag.
- 4.12 Do not use oxygen for cleaning, pressurization, or for ventilation.
- 4.13 Do not relight flame on hot work when in an enclosed space. Allow time for gases to escape and then use friction lighter.
- 4.14 A metal part which is suspiciously light probably has a void inside and an opening should be drilled before heating. Electrical boxes at the end of conduit should be opened prior to cutting conduit. Valves on both ends of piping should be opened.
- 4.15 Never lay work that is to be heated or welded on a concrete floor because when sufficiently heated, concrete may spill and fly with danger of injury.
- 4.16 Do not cut material in such a position that severed parts will fall striking legs or feet of the operator or assistant, or damage gas lines.
- 4.17 When a flashback occurs, both gases should be shut off -- first oxygen, then acetylene. Before lighting the torch again, see that it is cool and that no damage has been done to the torch, hose, or regulator.
- 4.18 Mark work "HOT" if left unattended or where others may come in contact with hot surfaces.
- 4.19 When burning operations are to be stopped for a few minutes during the course of the work, it is permitted to close torch valves only. When work is stopped for a longer period or is left unattended, the following steps must be taken:
 - Close oxygen and acetylene cylinder valves
 - Open torch valves to relieve pressure, then close again
 - Release regulator pressure adjusting screws
- 4.20 Before regulator is removed from a cylinder, the cylinder valve will be closed and the gas released from the regulator.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The normal personal protective equipment worn when working with hazardous materials generally provide inadequate protection from flames or heat. The person performing the work shall supplement the existing equipment with the following:

- Welding gloves fashioned from leather or other fire-resistant material;

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------|--------------------------------|---------------|
| SUBJECT: HOT WORK | NUMBER: 20 | PAGE: 4 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

- Apron or jacket fashioned from leather or other fire-resistant material;
- Chaps, if necessary, for leg protection; and
- Eye protection and face protection. Note: Normal chemical protective clothing is inappropriate for fire situations.

6.0 HOT WORK PERMIT

- 6.1 No employee of EARTH TECH is to begin hot work unless a hot work permit has been obtained. It is the responsibility of the project supervisor to request this permit. The hot work permit shall be signed by the supervisor and site safety officer and explained to each affected employee.
- 6.1.1 It is the responsibility of the project supervisor to see that workers comply with all safety practices of the hot work permit.
- 6.2 The hot work permit will be valid for a single work shift only. On projects requiring more than a single work shift, a new permit shall be completed at the start of each shift. The permit shall be displayed at the project site.
- 6.3 At the conclusion of the project, the hot work permits will be forwarded to the site project control technician and placed in the project file.

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HOT WORK PERMIT

Date: _____ Person Completing (print): _____

Object on which hot work is to be performed: _____

| | YES | NO | NA* |
|--|-----|----|-----|
| 1. Are all combustible materials and other fire hazards within 35 feet of the intended hot work perimeter removed? | | | |
| If yes to question 1, go to question 2. If no, answer the following: | | | |
| Are appropriate guards installed to protect any remaining combustible/fire hazards from heat, sparks and slag. | | | |
| Is a trained fire watch assigned for the duration of the project? Complete question 6 below. | | | |
| 2. Has the hot work area been inspected to determine if there are any floor/wall openings or cracks? | | | |
| 3. Have any identified floor/wall openings (including open doors, windows) or cracks been closed? If not: | | | |
| Have precautions been taken so that no combustible/flammable materials on the floor below, in the wall(s) or in adjacent rooms will be exposed to sparks, heat or slag. | | | |
| 4. Are suitable class fire extinguishers available at the hot work site? | | | |
| 5. Do any of the following conditions exist: Combustible/flammable materials within 35 feet (refer to question 1). Floor/wall openings or cracks within 35 feet of the hot work which could not be closed Combustible/flammable materials are more than 35 feet away, but are easily ignited. Combustible/flammable materials are in adjacent rooms (or in use in adjacent rooms), and, heat conduction through the wall/floor/ceiling can ignite the material. If yes for any of the above, a fire watch shall be assigned, and question 6 answered. | | | |

| | YES | NO | NA* |
|---|-----|----|-----|
| 6. Fire Watch assigned has: | | | |
| Been trained in the duties, and in the use of the available fire extinguishing equipment. | | | |
| An appropriate fire extinguisher available for use. | | | |
| Been made familiar with the location and use of available alarm facilities. | | | |
| Been assigned to be onsite prior to the start of the hot work, and for a minimum of ½ hour after hot work completion. | | | |
| 7. Will hot work be performed on piping systems which either contact combustible materials (i.e. walls), can transmit heat to compressed cylinders, or contain combustible/flammable materials? | | | |
| If so, has the piping system been isolated to prevent heat transmission to the combustible material, or, to the compressed gas cylinder? | | | |
| If the pipe contained combustible/flammable material, has the pipe been purged or inerted? | | | |
| 8. Will the hot work be performed in a confined space? If yes: | | | |
| Has all the requirements for confined space entry been performed? | | | |
| Readings for the Lower Explosive Limit (LEL) are less than 10 %. | | | |

I have inspected the work site, and have verified the above information.

Response Manager** (print)

Response Manager** (signature)

Expiration date of this permit: _____

* not applicable

** or SSO

HOT WORK PERMIT

| | |
|------------------------------|-------------------------|
| Section/Location | Good for this date only |
| Specific vessel or equipment | |
| Work to be done | |

Tests

| State exact location of test | Time | % LEL | % O ₂ | Other | Other | Other |
|------------------------------|------|-------|------------------|-------|-------|-------|
| | | | | | | |
| | | | | | | |
| | | | | | | |

Checklist

| | Initial | |
|--|---------|----------------|
| | Yes | Does not apply |
| Client representative has been informed of the work to be done | | |
| Operations/plant personnel have been informed of the work to be done | | |
| All tanks/lines/valves are disconnected, blinded, or locked out | | |
| Equipment and all attached piping has been cleaned and purged with water ____, steam ____, inert gas ____, or air ____ | | |
| Electrical service has been locked out and tagged | | |
| All grounding and bonding wires are in place | | |
| Surrounding equipment and operation: are safe for hot work | | |
| No open vessels or lines are within 35 feet of hot work area | | |
| Fire watch has been provided by contractor | | |

Personal Protective Equipment

| EYES | BODY | EXTREMITIES | RESPIRATORY | EQUIPMENT |
|---|---|--------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> Chemical goggles | <input type="checkbox"/> White tyvek | <input type="checkbox"/> Gloves | <input type="checkbox"/> APR, cart. | <input type="checkbox"/> Fire extinguisher |
| <input type="checkbox"/> Face shield | <input type="checkbox"/> Poly-coated tyvek | <input type="checkbox"/> Hard hat | <input type="checkbox"/> Airline | <input type="checkbox"/> Fire blanket |
| <input type="checkbox"/> Safety glasses | <input type="checkbox"/> Rain gear | <input type="checkbox"/> Boots | <input type="checkbox"/> SCBA | <input type="checkbox"/> Charged water hose |
| <input type="checkbox"/> Welder's mask | <input type="checkbox"/> Environmental suit | <input type="checkbox"/> Other _____ | <input type="checkbox"/> PAPR | <input type="checkbox"/> Combustible gas indicator |

Special Instructions

| |
|--|
| |
| |
| |

Completed by: _____ Signature: _____ Date: _____

• Safety Officer: _____

HEALTH AND SAFETY PROCEDURES

SUBJECT:

LOCKOUT/TAGOUT

NUMBER: 21

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 5, 1994

1.0 POLICY

Equipment will be removed from service via lockout/tagout when the unexpected or inadvertent movement of machine or materials or energizing of circuits poses a threat to worker safety.

2.0 PURPOSE

This procedure establishes the minimum safety requirements to ensure the proper deactivation of movable, electrically energized, pressurized equipment and systems, and systems containing hazardous materials prior to repairing, cleaning, oiling, adjusting or similar work.

3.0 SCOPE

This procedure applies to all equipment that receives its energy from electrical power, hydraulic fluid under pressure, compressed air, steam, energy stored in springs, potential energy from suspended parts, or any other source that may cause unexpected movement when it is necessary to perform work on that system. It also applies to similar functions performed on systems containing hazardous materials.

4.0 DEFINITIONS

- 4.1 Lockout is the use of a locking device, usually unlocked by a key, that is affixed to the prime source of energy of a piece of equipment or the source of systems containing hazardous materials. The locking device shall be used to prevent undesired movement or flow of material.
- 4.2 Tagout is the use of a Danger Tag (facsimile of the "Danger Do Not Operate" tag is shown following this procedure) that is always to be affixed to the prime source of energy of a piece of equipment or source of systems containing hazardous materials in such a manner that it cannot be accidentally removed. On the tag should be written the reason for shutdown and must contain the name of the person hanging the tag and date it is hung. The tag only is sufficient when the equipment is incapable of being locked out provided the equipment is disconnected from its source of energy.
- 4.3 Authorized personnel is the person or persons who lockout/tagout equipment and their immediate supervisor. NO ONE is permitted to remove a lock or a tag except the authorized personnel.
- 4.4 Extension tools, such as swabs, brushes, scrapers, or other methods or means to protect personnel from injury, may be used where it is clearly impossible to shutdown equipment for servicing. These conditions may exist only upon supervisory permission and personnel training.
- 4.5 Low voltage is voltage below 600 volts. Where applicable to energized circuits, this procedure applies to low voltage only.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------|--------------------------------|---------------|
| SUBJECT: LOCKOUT/TAGOUT | NUMBER: 21 | PAGE: 2 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

5.0 REQUIREMENTS

- 5.1 The supervisor having jurisdiction over personnel assigned to perform maintenance functions has the responsibility to provide lockout devices and hanger tags and to train personnel in their use.
- 5.2 Where a job requires more than one craft or employee to accomplish, each employee is responsible to hang their own lock and/or tag.
- 5.3 All crafts, departments, and shifts involved must be notified of a shutdown requiring lockout/tagout.
- 5.4 UNAUTHORIZED REMOVAL OF LOCK OR DANGER IS A SERIOUS BREACH OF SAFETY REGULATIONS.
- 5.5 Machinery or equipment capable of movement must be stopped and the power source de-energized or disengaged and, if possible, the movable parts that may present a hazard shall be mechanically blocked or locked to prevent inadvertent movement during any work on that system.
- 5.6 Every prime mover or power driven machine equipped with locking controls or readily adaptable to locking controls must be locked out or positively sealed in the OFF position during work operations. Machines or prime movers not equipped with locking controls, or not readily adaptable to locking controls, must be de-energized or disconnected from their source of power, or other action which will prevent the prime mover or machine from inadvertent movement. In all cases, danger tags shall be placed on the controls of the machines and prime movers during repair work.
- 5.7 All electrical equipment and systems are to be treated as energized until tested or otherwise proven to be de-energized.
- 5.8 Electrical equipment and systems must, where possible, be de-energized prior to commencing work on them. The disconnect means is to be locked in the open position or other positive methods or procedures implemented which will effectively prevent unexpected or inadvertent energizing of a designated circuit, equipment, or appliance. "Danger" tags shall be used in all cases and may be used alone where it is not practical or possible to lockout the system.
- 5.9 Work on energized parts of equipment or systems may be performed only after the following conditions have been met:
 - Responsible supervision has determined that it is necessary to work on energized equipment or systems, and the Health and Safety Manager has approved of the operation.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

LOCKOUT/TAGOUT

NUMBER: 21

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 5, 1994

- Involved personnel have received instructions on the work techniques and hazards involved in the particular task to be performed.
- Suitable personal protective equipment, such as gloves and eye protection, are provided and used.

- 5.10 Systems or equipment may be pressurized with various media, such as air, gas, steam, and/or hydraulic fluid in the form of water or oil.

The pressurizing, source, such as compressors, pumps, boilers, etc., shall be shut down and locked out and/or tagged out.

- 5.11 Pipes or lines that convey pressurized substances shall be bled to atmospheric pressure prior to opening the system.

- 5.12 Once the system has been bled to atmospheric pressure the pipes or lines shall be disconnected, blinded, or closed by a valve and locked out and/or tagged accordingly. Observe line entry procedures.

- 5.13 A system, or portion of a system, containing hazardous materials that is to be serviced shall be drained from the lowest elevation, and if hot, allowed to return to ambient temperature prior to commencing work. Containers of compatible material must be used along with appropriate ventilation/scrubber systems. Once the system has been determined to be safe to commence work, pipes or lines shall be disconnected blinded or closed by a valve, and locked out and/or tagged accordingly.

- 5.14 Some equipment may have several sources of energy, such as electrical motors, hydraulic pressure, and may contain hazardous materials. Each source of energy must be considered separately and protected appropriately.

- 5.15 Where a job requires more than one craft or more than one employee to accomplish, each employee shall hang their own lock and/or tag.

- 5.16 After completion of a job requiring more than one employee each employee is responsible to remove their own lock or tag. The only other person authorized to remove a lock or tag is the site supervisor.

- 5.17 The supervisor who has overall responsibility of the job is responsible to ensure all that locks and/or tags have been removed prior to re-activating the system or equipment.

HEALTH AND SAFETY PROCEDURES

| | | |
|----------------------------|--------------------------------|---------------|
| SUBJECT: EXCAVATION | NUMBER: 22 | PAGE: 1 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

1.0 POLICY

Employees are not to work in or around excavations unless excavations are properly shored or sloped.

2.0 PURPOSE

This procedure outlines requirements for excavating soil and is intended to protect personnel from the hazards of excavation collapse.

3.0 GENERAL REQUIREMENTS

Safety operations while working in and around excavations involve many factors. Factors to be evaluated and discussed at daily safety meetings before starting work include:

- 3.1 Soil Structure: Excavations in wet soil, sandy soil, or areas that have been backfilled are relatively unstable and must be supported or sloped if employees are to enter the excavation.
- 3.2 Weather Conditions: Changing weather conditions greatly affect the safety of working in and around excavations. Excess water from rain or snow loosens the soil, increasing the chance of the soil caving in. Excavation should be diked, pumped, or covered, to prevent an excessive amount of water from accumulating.
- 3.3 Superimposed Loads: Superimposed loads in the vicinity of excavation walls increase the probability of a cave-in. Heavy equipment and materials should be kept back as far as possible. Heavy equipment should be placed on wooden mats or planking to spread the weight more evenly. Considerations must also be taken when buildings, curbs, trees, utility poles, and other structures are around the excavation. Soil excavated must be stored away from the edge and be barricaded or retained in an effective manner.

4.0 SPECIFIC REQUIREMENTS

Specific requirements in this safety plan are minimum regulations which are contained in 29 CFR Subpart P 1926.65, 1926.651, and 1926.652 OSHA Safety and Health for Construction.

- 4.1 Walkways and sidewalks shall be kept clear of excavated materials. Sidewalks which must be undermined must be shored to carry a load of 125 pounds per square foot.
- 4.2 Planks used for walkways shall be laid parallel to the length of the walkway and fastened together.
- 4.3 Employees subjected to vehicle traffic in excavating operations shall don reflective clothing.

HEALTH AND SAFETY PROCEDURES

| | | |
|----------------------------|--------------------------------|---------------|
| SUBJECT: EXCAVATION | NUMBER: 22 | PAGE: 2 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 5, 1994 | |

- 4.4 Excavations shall be inspected; if the possibility of cave-in or slide exists, employees shall exit the space until proper precautions have been taken.
- 4.5 Prior to opening an excavation, all efforts shall be made to locate all underground utilities. The utilities shall be marked.
- 4.6 Excavations deeper than 5 feet which are entered by employees shall be sloped, shored, or protected by some other equivalent means.
- 4.7 Excavations below the level of the base of footings of a subsurface structure shall not be permitted, unless the wall is underpinned.
- 4.8 When employees are required to work in an excavation 4 feet or deeper, a ladder shall be provided. The maximum horizontal travel distance to the ladder shall be 25 feet. The ladder shall extend a minimum of 3 feet above the excavation and be secured. This ladder shall not be removed until all employees have exited the excavation.
- 4.9 Guardrail or fences shall be placed at all excavations which are close to sidewalks, drives, or other thoroughfares. Adequate protection shall also exist at remote excavations where workers are not present.
- 4.10 Excavated soil must be kept at least 2 feet from the edge of the excavation.

5.0 ANGLE OF REPOSE

- 5.1 OSHA requires that all excavations more than 5 feet deep which will be entered by employees shall be shored, sheeted, braced, or supported.
- 5.2 The preferred method is to slope the sides of the excavation to the angle of repose, or the angle of control at which the soil will remain at rest. The angle of repose varies with different kinds of soil; this angle must be determined on each individual excavation.
- 5.3 The second method of support is shoring, sheeting, tightly placed timber shores, bracing, trench jacks, piles, or other materials installed in manner strong enough to resist the pressures surrounding the excavations.
- 5.4 The third method is to use a trench box, which is a prefabricated movable trench shield made of steel plates, welded to a steel frame.

6.0 APPROVAL

The Site Safety Officer or Corporate Health and Safety Manager is to approve all shoring or sloping prior to personnel entry.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: UNDERGROUND TANK REMOVAL | NUMBER: 23 | PAGE: 1 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

1.0 POLICY

All underground tank removal projects will be conducted according to this procedure. A site safety plan will be prepared which addresses the points discussed in this procedure.

2.0 PURPOSE

This procedure outlines the steps necessary to ensure the safe removal of underground tanks.

3.0 SITE ASSESSMENT

- 3.1 Visually inspect the site to ensure that the work can be safely done. Special attention must be given to safe work surfaces for equipment, the presence of overhead lines which may hinder equipment operation, and local traffic which may be affected.
- 3.2 Call the local utility companies to locate telephone, power, water, and sewer lines which may be in the way of excavation. Ensure they are well marked before excavation.
- 3.3 Locate the tank, together with piping, vents, and manways.
- 3.4 Sample the tank to verify that the tank contains the product which was indicated. Note liquid levels. Check for the presence of water and other contaminants.
- 3.5 Sample the tank vapor space with 02/LEL meter to verify safe/unsafe conditions.

4.0 TANK EXCAVATION

- 4.1 Establish the boundaries of the exclusion zone so that unprotected personnel will not accidentally come in contact with any possible liquid splashes or vapors arising from the excavation.
- 4.2 Ensure that all walking/working surfaces and area are in a safe condition. A firm footing for equipment and personnel must be established on the overburden. If not, the areas need to be stabilized. If it is possible for excavation of hoisting equipment to contact overhead power lines, then these will need to be de-energized prior to beginning operations. Note that for tracked vehicles, the proper alignment with an excavation is to have the tracks perpendicular to the excavation.
- 4.3 While the overburden is being removed, if free product or saturated soil is likely to be contacted, then a proper storage area for this spoil material must be designated. This area may need to be lined and diked. If free product or saturated soils are found, both toxic and flammable readings shall be taken at the work site and perimeter.
- 4.4 The excavation wall may have to be sloped or shored to ensure that the walls do not collapse. Remember that an excavation above shoulder level is considered a confined

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: UNDERGROUND TANK REMOVAL | NUMBER: 23 | PAGE: 2 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

space. These are definite OSHA standards for both excavations and confined space entry which we addressed in EARTH TECH Health and Safety Procedures.

- 4.5 If personnel enter the excavation, they shall use the proper protective equipment, and follow confined space entry procedures, as appropriate.
- 4.6 If open excavations are left unattended, proper barricades and warning signals shall be set up to actively warn all personnel of the open pit hazard. In certain areas, additional security measures may need to be instituted in the form of fences or security guards.

5.0 TANK REMOVAL

- 5.1 All products will be removed by pumping (if possible).
- 5.2 If the tank atmosphere is flammable, the tank shall be inserted prior to removal. This can be done by introducing nitrogen or dry ice (CO₂) until the oxygen content is 8% or less, or "foamed" with fire fighting or vapor suppression foam to suppress vaporization, along with ventilation to below 10% LEL. Depending on the situation and product, one method may be preferred to the other (a description of each method is given under the Safety Certification).
- 5.3 If possible, all lines will be removed by disconnecting joints rather than cutting or burning. No hot work will be performed without a hot work permit issued after LEL testing.
- 5.4 The tank will then be carefully lifted and moved to the decontamination area for decontamination. Note that the shears should not be used for lifting, but only for cutting the tank since the weight of the shears approach the maximum lifting capacity of the Caterpillar 215/225.

6.0 TANK DECONTAMINATION

- 6.1 Decontamination is required to remove residue from the tank, so the tank can be disposed of as a clean material, or shipped safely.
- 6.2 The decontamination area will be marked as an exclusion zone. Proper personnel, protective equipment, medical emergency equipment, splash shower, and eye wash, should be available.
- 6.3 Before opening the tank to permit entry for water blasting, foaming, or other cleaning methods are used, the tank will again be checked for the presence of flammables and appropriate actions taken to reduce flammable levels. Confined space entry procedures apply.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

UNDERGROUND TANK REMOVAL

NUMBER: 23

PAGE: 3 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

6.4 Personnel will wear PVC splash suits with respiratory protection appropriate to the hazards.

6.5 A method for rinse water containment and proper disposal procedures will be established.

7.0 SAFETY CERTIFICATION BEFORE CUTTING TANKS

7.1 The preferred method of cutting (rendering) tanks is to use the power shears attached to a boom vehicle. The less preferred method is to use a cutting torch. A power metal chisel may also be used. The primary hazard when cutting tanks, using either the shears, cutting torch, or chisel is the possibility of catapulting metal pieces must also be considered. Whenever tanks are cut, all unnecessary personnel should be removed from the area. The possibility of explosion of flammable vapors should always be considered.

7.2 Sample the tank atmosphere for flammables and oxygen. Before a tank can be cut with either shears, cutting torch, or chisel, the tank atmosphere must be less than 10% LEL or less than 8% O₂. If the tank atmosphere contains flammable vapors in excess of 10% LEL, then some action must be taken to reduce the flammable vapor concentration or reduce the oxygen concentration to less than 8% O₂.

Air monitoring equipment should respond to the specific gas encountered. Never use non-intrinsically safe equipment such as a photoionization detector (PID) in a potentially explosive environment.

7.3 If the tank atmosphere is greater than 10% LEL, one of these actions can be taken to make the tank safe for cutting.

Ventilate the Tank: This procedure only will work with fairly clean products. (The tank will re-gas rapidly if not a clean product). Readings should be taken at the location of the tank exhaust to check for flammables. Note that exhausted vapors may be flammable, toxic, or require respiratory protection.

Clean and Ventilate the Tank: Use a cleaning method such as butterworthing with hot water, pump out liquids, and then ventilate as above.

Inert the Tank: Nitrogen from a liquid nitrogen tank, or carbon dioxide from dry ice can be used to inert the atmosphere in the tank to below the oxygen concentration necessary for combustion. Note that flammable vapors will still be present; and once the tank is cut or opened, the inert gas can be lost. The atmosphere must be diluted to less than 8% O₂ by volume to be completely safe for normal petroleum products. A LEL meter must be used to verify the O₂ concentration. Measurements must be made continuously. The quantity of inert gas which must be used depends on how the gas is presented to the tank. In practice, about 6 to 8 and perhaps as many as 10 tank volumes would be required, depending on how the material is administered. If dry ice is used approximately, 11.5 pounds of dry ice per 100 cubic feet (15 pounds per 1,000 gallons) of tank volume is required to reduce the

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: UNDERGROUND TANK REMOVAL | NUMBER: 23 | PAGE: 4 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

oxygen to 8%. There are several precautions which must be observed when using dry ice. The material is extremely cold - 109.3° F. Also, the CO₂ produced will be absorbed into any water present, thus effectively increasing the oxygen concentration.

- 7.4 Foam the Tank: If product cannot be totally removed a method which has proven successful is to "foam" the surface of the remaining liquid with a fire fighting or vapor suppression foam. This foam blend should be 3 inches or 4 inches thick and will have the effect of suppressing vaporization of the volatile material.

The foam must be applied through a tank opening and thus the tank must be opened. After laying the foam blanket, the tank may have to be ventilated so that the vapor flammable concentration is reduced to less than 10% of the LEL on the combustible gas indicator. In extreme cases, high expansion foam can be used to completely fill the tank. Obviously, no ventilation will be necessary in this case.

- 7.5 The general rule of thumb for cutting tanks with a cutting torch is that cutting slag should never be allowed to fall into free product.
- 7.6 Naturally when cutting tanks by any method, appropriate fire protection should be available.

8.0 OTHER SITUATIONS

Under certain situations, the tank may need to be opened and cleaned before removal. In this case, a reordering of steps is appropriate. These are previously discussed:

- ☞ Remove pumpable product
- ☞ Test tank interior for flammables
- ☞ If flammable, inert and purge
- ☞ Retest atmosphere and repeat until safe
- ☞ Open tank
- ☞ Retest atmosphere for flammables and toxics
- ☞ Clean as much as possible remotely with equipment
- ☞ Allow properly protected personnel to enter for final steps

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HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: HIGH PRESSURE WASHER (LASER) | NUMBER: 24 | PAGE: 1 OF: 2 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

1.0 POLICY

All users of high-pressure washers (Lasers) will comply with this procedure. The Laser is a very effective but potentially dangerous piece of equipment. Only trained, authorized personnel will operate the high-pressure washer.

2.0 PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The following equipment will be worn by operators and assistants:

- Safety shoes or boots;
- Metal foot and shin guards;
- Hearing protection;
- Eye protection (goggles and face shield);
- Hard hat with faceshield;
- PVC rain suit or PVC acid suit;
- Heavy gloves such as monkey grips; AND
- Chemical protective equipment may also be required.

4.0 PROCEDURE

- 4.1 Only trained, authorized personnel will operate the high-pressure washer.
- 4.2 The lance must always be pointed at the work area.
- 4.3 The operator must maintain good footing.
- 4.4 The operator must have an assistant to aid in moving the hose to different areas and backing up the operator. The assistant must remain in back of the operator.
- 4.5 Non-operators must remain a minimum of 25 feet from the operator.
- 4.6 The operating pressure should never exceed that which is necessary to complete the job.
- 4.7 No unauthorized attachment may be made to the unit. (The trigger should never be tied down.)
- 4.8 Operators should be changed at frequent intervals to avoid fatigue (at least hourly).

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HIGH PRESSURE WASHER (LASER)

NUMBER: 24

PAGE: 2 OF: 2

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

- 4.9 Equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.
- 4.10 An assistant should always be standing by at the pressure generator.
- 4.11 All users must be trained in emergency shut down procedures and general equipment maintenance.

FORMS SOPHPWASHER 24

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CRANES AND LIFTING DEVICES

NUMBER: 25

PAGE: 1 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

1.0 POLICY

Site lifting activities shall comply with all Federal, state, and local laws as well as safe practices dictated by the crane's manufacturer and those deemed as established safe work procedures by the construction industry.

2.0 PURPOSE

This procedure describes requirements for maintenance and operation of hoisting equipment.

3.0 GENERAL REQUIREMENTS

- 3.1 Earth Tech will only use cranes and other hoisting equipment that is in safe working order. To maintain this policy, all crane equipment brought onto the project site will be inspected for structural integrity, smooth operational performance, and proper functioning of all critical safety devices in accordance with the crane manufacturer's specifications. This inspection will be performed by the Earth Tech site supervisor and site safety officer, and the crane operator.
- 3.2 All equipment not conforming to the operational and safety requirements set forth during this inspection will not be put into service until all necessary repairs are made to the satisfaction of the inspection group. If any existing job cranes are to be used, they shall be inspected by a certified inspection agency prior to use.
- 3.3 Only qualified crane operators familiar with the equipment to be used will be permitted to operate the crane. Subcontractors will supply proof of their operators' capability and experience to operate the crane in a safe manner. Earth Tech reserves the right to remove from the project site any crane operator if there is a question or doubt concerning the operator's capabilities.
- 3.4 All hooks, slings, and other fittings shall be of correct size for the work to be done and shall have sufficient strength to safely sustain the loads imposed on them.
- 3.5 Employees shall refrain from standing or walking beneath crane booms.
- 3.6 In the event of emergency repair work of hoisting equipment with a suspended load, the area below the load shall be barricaded and the load blocked up or otherwise supported.
- 3.7 Employees are not to ride loads, hooks, medicine balls, or slings suspended from hoisting equipment.
- 3.8 Side pulls shall be avoided in all cases. The load must be directly under the hoist.
- 3.9 The safety latch on the hook of hoisting equipment must be in a closed position.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: CRANES AND LIFTING DEVICES | NUMBER: 25 | PAGE: 2 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

- 3.10 Use of deformed or defective hooks, rings, pins, shackles, or other lifting attachments is prohibited. Chain or wire rope shall be free of kinks, sharp bends, or twists.

4.0 RIGGER COMPONENTS

- 4.1 Rigging components will be inspected daily by members of the rigging team. In addition, allowable wire breaks and wear on hoisting ropes will follow *The Handbook of Rigging for Construction and Industrial Operations*, third edition, W.E. Rossnagel.
- 4.2 Each sling is to be marked or tagged with its rated capacity.
- 4.3 Slings are not to be used with loads in excess of their rated capacity.
- 4.4 Wire-rope slings are to be immediately removed from service if any of the following conditions are present:
- Six randomly distributed broken wires in one rope lay, or three broken wires in one strand in one rope lay.
 - Wear or scraping of 1/3 the original diameter of outside individual wires.
 - Kinking, crushing, bird caging, or any other damage resulting in distortion of the wire-rope structure.
 - Evidence of heat damage.
 - End attachments that are cracked, deformed, or worn.
 - Hooks that have been opened more than 15 percent or the normal throat opening, measured at the narrowest point, or twisted more than 10 degrees from the plane of the unbent hook.
 - Corrosion of the rope or end attachments.

5.0 CRANE OPERATORS

- 5.1 Since the crane is a specialized piece of heavy equipment, it warrants special safety protocols. It is policy to establish a crane and rigging safety program for all sites using this equipment.
- 5.2 Crane performance shall be according to the manufacturer's designs and established construction safe work practices. At no given time will crane operation be permitted out of the design specifications of the unit or the safety requirements deemed by Federal or state

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CRANES AND LIFTING DEVICES

NUMBER: 25

PAGE: 3 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

safety standards. The following safety policies will be enforced at all times during crane operations:

- Accessible areas within the swing radius will be barricaded to prevent employee injury.
- No crane will operate in a heavy lift mode without its outriggers fully extended to assure maximum stabilization of the equipment.
- All hand signals used will be in accordance to American National Standards Institute's (ANSI's) B30.5-68, "Basic Hand Signals for Boom Equipment Operation." Only one individual will issue operational hand signals to the crane operator unless it is established that relay hand signaling for blind craning situations is required.
- **Load capacity limitations:**
 - All load weights are to be estimated to within ± 5 percent for all critical lift operations. All hoisting capabilities of the crane in use will be according to the load capacity chart specified by the manufacturer. Load weight will be calculated with all rigging components considered as part of the load.
- **Swing loads**
 - Tag lines for controlling loads will be used at all times. Suspended loads, regardless of the size and weight, will not be hoisted over employees.
- The operator and rigger will ascertain that a load is properly secured and balanced before it is lifted more than a few inches off the floor or surface.

5.3 Lift Strategy: To address different types of lifts, a lift strategy plan has been established by Earth Tech. Under this plan, Earth Tech will use the crane's load capacity and specific rigging requirements to classify the lift. Under these guidelines, various lift strategies will be followed.

- **General Lifts:** General lifts are small-scale hoisting activities which require daily rigging inspection. To distinguish what items are considered general lifts, the load capacity chart of the specific crane in use will be the criteria. General lifts for this plan are those lifts that do not exceed the crane's load capacity rating in its least stable, but safe operating position.
- **Major Lifts:** Major lifts are those that require the attention of the Supervisor or his designated representative to review the lift and rigging operations during the actual lift. Major lifts are those that are less than 75 percent of the crane's upper load rating on the load capacity chart. Major lifts may also include those lifts with unusual configurations that require special attention in rigging.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CRANES AND LIFTING DEVICES

NUMBER: 25

PAGE: 4 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

- **Critical Lifts:** Critical lifts are those which exceed 75 percent of the crane's load capacity rating. Critical lifts will not be enacted until an overall lift review detailing all weight calculations and lift strategy has been conducted.

5.4 Direct supervisory and safety supervision will be mandatory for all major and critical lifts.

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HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: FORKLIFTS AND TOW MOTORS | NUMBER: 26 | PAGE: 1 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

1.0 POLICY

Only trained and authorized operators shall be permitted to operate industrial forklifts and tow motors.

2.0 PURPOSE

This procedure establishes minimum standards for the safe and efficient operation of forklifts and tow motors.

3.0 REQUIREMENTS

3.1 Operators of forklifts and tow motors must be trained and authorized.

3.1.1 To qualify for a new license, the employee must:

- View both training videos;
- Complete field training; and
- Successfully pass a road test.

3.1.2 An annual retraining consisting of viewing the videos is necessary for recertification.

3.1.3 All operators of forklifts and tow motors will receive an Industrial Lift Truck Card authorizing their use of such equipment. This card is to be in the operator's possession whenever using this equipment.

3.2 Each driver is to check his vehicle at least once per shift. If it is found to be unsafe, the matter shall be reported immediately to his supervisor, and the vehicle not put in service again until it is repaired. Attention is to be given to the proper functioning of tires, horn, lights, battery, brakes, steering mechanism, and the lift system of forklifts.

3.2.1 The Forklift and Tow Tractor Checklist, reproduced following this procedure, is to be used to satisfy the requirements of this paragraph. Checklists should be kept with the vehicle or in the supervisor's office and maintained for a period of six months by the supervisor.

3.3 The authorized or safe speed is not to be exceeded. Each driver is to maintain a safe distance from other vehicles, keeping his vehicle under positive control at all times. All established traffic regulations are to be observed. For forklifts travelling in the same direction, a safe distance may be considered to be approximately 3 lengths, or preferably a time lapse - three seconds - passing the same point.

3.4 Stunt driving and horseplay are prohibited.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

FORKLIFTS AND TOW MOTORS

NUMBER: 26

PAGE: 2 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

- 3.5 Loaded vehicles are not to be moved until the load is safe and secure.
- 3.6 When a driver leaves a vehicle unattended, the power must be shut off, brakes set, the mast brought to the vertical position, and forks left in the down position. When left on an incline, the wheels must be blocked. Keys are to be removed from vehicles parked in isolated areas.
- Note:** Do not depend on a seat brake unless that is the only parking brake on the equipment. Always use hand brake, if available.
- 3.6.1 A powered industrial forklift is unattended when the operator is 25 feet or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in view.
- 3.6.2 When the operator of an industrial forklift has dismounted and is within 25 feet of the vehicle still in his view, the load-engaging means must be fully lowered, controls neutralized, and the brakes set to prevent movement.
- 3.7 Forklifts are not to be driven up to anyone standing in front of a fixed object of such size that the person could be caught between the vehicle and object.
- 3.8 Operators are to look or face in the direction of travel and not move a vehicle until certain that all persons are in the clear.
- 3.9 Vehicles are not to be operated on floors or platforms that will not safely support the loaded vehicle.
- 3.10 Riding on the forks of lift trucks is prohibited.
- 3.11 Forks must always be carried as low as possible, consistent with safe operation (normally, approximately four inches above the running surface).
- 3.12 Extreme care is to be used when tilting loads.
- 3.13 Forklifts are not to be driven in and out of highway trucks and trailers at unloading docks until such trucks are securely blocked and brakes set.
- 3.14 Employees must not place any part of their body outside the running lines of the forklift or between mast uprights or other parts where shear or crushing hazards exist.
- 3.15 Employees are not allowed to stand, pass, or work under the elevated portion of any forklift, loaded or empty, unless it is effectively blocked to prevent it from falling.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

FORKLIFTS AND TOW MOTORS

NUMBER: 26

PAGE: 3 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 6, 1994

- 3.15.1 The forks of a forklift are never to be used to elevate a person to a higher level, unless a proper platform with guardrails is provided and the platform is fastened to the mast.
- 3.16 Railroad tracks are to be crossed diagonally, wherever possible. Parking closer than 8-10 feet from the center line of the railroad track is prohibited.
- 3.17 The width of one tire on the forklift is the minimum distance from the edge to be maintained while it is on any elevated dock, platform, or freight car.
- 3.18 When forklifts are used to open and close freight car doors, the following provisions must be observed:
 - 3.18.1 A device specifically designed for opening or closing freight car doors is to be attached to the forklift.
 - 3.18.2 The force applied by the device to the freight car door is to be applied parallel to the direction of travel of the freight car door.
 - 3.18.3 The entire door opening operation must be in full view of the operator.
 - 3.18.4 The forklift operator and other dock employees must be clear of the area where the door might fall while being opened.
- 3.19 Prior to driving onto trucks, trailers, and railroad cars, their flooring must be checked for breaks and other structural weaknesses.
- 3.20 Other forklifts travelling in the same direction are not to be passed at intersections, blind spots, or dangerous locations.
- 3.21 Drivers are to slow down and sound the horn at cross aisles and other locations where vision is obstructed.
- 3.22 If the load being carried obstructs forward view, the drivers are to travel with the load trailing.
- 3.23 Grades must be ascended or descended slowly.
 - 3.23.1 When ascending or descending grades in excess of 10 percent, loaded forklifts must be driven with the load upgrade.
 - 3.23.2 On all grades, the load and load-engaging means are to be tilted back if applicable, and raised only as far as necessary to clear the road surface.
- 3.24 Forklifts must not be loaded in excess of their rated capacity.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: FORKLIFTS AND TOW MOTORS | NUMBER: 26 | PAGE: 4 OF: 4 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 6, 1994 | |

- 3.25 Forklifts are not to be operated with a leak in the fuel system.
- 3.26 Extreme care is to be taken when tilting loads. Tilting forward with the load engaging means elevated is prohibited except when picking up a load. Elevated loads are not to be tilted forward except when the load is being deposited onto a storage rack or equivalent. When stacking or tiering, backward tilt is limited to that necessary to stabilize the load.
- 3.27 The load-engaging device must be placed in such a manner that the load will be securely held or supported.
- 3.28 Special precautions are to be taken in the securing and handling of loads by forklifts equipped with attachments, and during the operation of these vehicles after the loads have been removed.
- 3.29 The wearing of seat belts is mandatory when operating any type of industrial tractor equipped with roll-over protective structure (ROPS).
- 3.30 "Operating Rules for Industrial Trucks" (Forklift and Tow Tractors) shall be posted where such equipment is used. "Employee Operating Instructions" for Industrial Tractors are included.

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DAILY INSPECTION FORKLIFTS AND TOW MOTORS

Item Inspected

Week of: _____

Inspectors Must Sign In _____

| | M | T | W | Th | F | S | S | |
|-------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------|
| Tires | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Monday _____ |
| Steering | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Tuesday _____ |
| Foot Brake | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Wednesday _____ |
| Hydraulic System | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Thursday _____ |
| Oil | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Friday _____ |
| Horn | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Saturday _____ |
| Chains | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sunday _____ |
| Mast | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Carriage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Fork Adjusting Slides | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Operators Must Sign In |
| Name Plate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| General Condition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Fire Extinguisher | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Fuel Connection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Clear of Extraneous Materials | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Lights | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Any discrepancies must be reported to maintenance!

Keep all body parts inside the Cage!

Drive carefully!

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FORKLIFT TRAINING/QUALIFICATIONS

Employee Name: _____

Department: _____

Previously Licensed: ☐ Yes ☐ No

Date _____

Video Training (Operation) Viewed On: _____

Date _____

Video Training (Inspection) Viewed On: _____

Date _____

Field Training: _____

Date _____

Road Test Given By: _____

Date _____

☐ Pass ☐ Fail

License Issued By: _____

Date _____

To Qualify For a New License Employee Must:

- View Both Training Videos; or
- Complete Field Training; and
- Successfully Pass Road Test.

To Requalify For a License (Annually):

- Employee Must View both Training Videos.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: PORTABLE LADDERS AND WORK PLATFORMS | NUMBER: 27 | PAGE: 1 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 12, 1994 | |

1.0 POLICY

Construction of wood or metal step ladders must meet applicable OSHA requirements and ANSI Standards and must not exceed 20 feet in height. Elevated work platforms must comply with this procedure.

2.0 PURPOSE

This procedure establishes criteria for the procurement, construction, care and use of portable ladders and work stands in order to ensure personnel safety under normal conditions of usage.

3.0 CARE AND USE OF LADDERS

- 3.1 Ladders are to be maintained in good condition at all times. The joint between the steps and side rails must be tight, all hardware and fittings securely attached, and the movable parts must operate freely without binding or undue play.
- 3.2 Safety feet and other auxiliary equipment are to be kept in good condition to ensure proper performance.
- 3.3 Ladders shall be stored in such a manner as to provide ease of access or inspection, and to prevent danger of accident when withdrawing a ladder for use.

Ladders are to be stored on racks designed to protect the ladder when not in use. These racks must have sufficient support points to prevent any possibility of excessive sagging.
- 3.4 When not in use, wooden ladders shall be stored at a location where there is good ventilation, but where they will not be exposed to the elements.
- 3.5 Ladders carried on vehicles shall be adequately supported to avoid sagging and securely fastened in position to minimize chafing and the effects of road shocks.
- 3.6 Wooden ladders shall be kept coated with a suitable protective material. Painting of ladders is permissible provided a clear finish is used.
- 3.7 Ladders are to be maintained in good usable condition at all times. Hardware fittings and accessories must be checked frequently and kept in good working condition.
- 3.8 Ladders are to be inspected and those which have developed defects are to be withdrawn from service for repair or destruction and tagged or marked "Unsafe, Do Not Use".
- 3.9 Ladders must not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.
- 3.10 Ladders must not be placed on boxes, barrels, or other unstable bases to obtain additional height.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: PORTABLE LADDERS AND WORK PLATFORMS | NUMBER: 27 | PAGE: 2 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 12, 1994 | |

- 3.11 Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment are not to be used. Improvised repairs are prohibited.
- 3.12 Tops of ordinary step ladders are not to be used as steps.
- 3.13 A ladder is not to be used to gain access to a roof unless the top of the ladder extends at least 3 feet above the point of support at eaves, gutter, or roof line.
- 3.14 The correct angle for using straight ladders is for the foot of the ladder to be placed from the wall a distance equal to one-fourth the effective length of the ladder. (Effective length = length of ladder from base to point of support.)
- 3.15 On two-section extension ladders, the minimum overlap for the two sections is to be at least 3 feet for ladders up to and including 36 feet in length.
- 3.16 Personnel using ladders must:
 - Face the ladder while working;
 - Work only within arm's length of the ladder;
 - Use both hands when ascending or descending;
 - Allow no other person on the ladder; and
 - Use rope to raise or lower materials and tools.
- 3.17 A portable ladder is designed as a one-man working ladder based on a 200-pound load. The ladder base section is to be placed with a secure footing. Safety shoes of good substantial design are to be installed on all ladders.
- 3.18 Portable metal ladders or work platforms are not to be used in the vicinity of electrical circuits or in places where they may come in contact with them. They are to be legibly marked with signs reading "CAUTION - DO NOT USE NEAR ELECTRICAL EQUIPMENT!" or equivalent wording.

4.0 MOBILE ELEVATED WORK PLATFORMS

- 4.1 Whenever a forklift is used to elevate employees for work positioning, a safe work platform having sufficient space to accommodate the employees and material being elevated, but having not less than 24-inch x 24-inch working space, is to be securely attached to the forks or mast in such a manner as to prevent tripping, slipping, or falling from the supports.
 - The platform must be equipped with standard guardrails, with midrails on all open or exposed sides, and toeboards are to be installed if work is performed where employees normally work or pass.
 - Where a clearance restriction or the nature of the work prohibits the use of guardrails, a safety belt or harness with lanyard must be used. The lanyard is to be attached to a point located above and near the center of the platform.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

PORTABLE LADDERS AND WORK PLATFORMS

NUMBER: 27

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 12, 1994

- An operator is to be at the controls of the forklift while employees are on the elevated platform.
 - The side of the platform nearest the mast frame truss shall be guarded. This guard shall consist of a substantial frame covered with 1/2 inch expanded metal, laminated safety glass, or equivalent providing effective guarding to a height of 7 feet.
- 4.2 If a forklift is to be operated under conditions which might expose the operator to danger from falling objects from the elevated work platform, the truck must be equipped with overhead protection.
- 4.3 Whenever elevating personnel, forklift operators must:
- Use a securely attached safety platform;
 - Make sure the lifting mechanism is operating smoothly;
 - Place mast vertical and never tilt forward or rearward when elevated;
 - Place truck in neutral and set parking brake;
 - Lift and lower smoothly and with caution;
 - Watch for overhead obstructions;
 - Keep hands and feet clear of controls other than those in use; and
 - Never travel with personnel on the work platform other than to make minor movements for final positioning of the platform.
- 4.4 For one-man type elevatable pneumatic or hydraulic lifts, means must be provided to render inoperative all operating controls other than those on the elevatable platform when the controls on the elevatable platform are being used. Only one set of controls is to be capable of being operated at one time.
- Outriggers are to be used in all cases where such accessory controls are provided with the lift.
- 4.5 Guardrails are to be installed on all work platforms in excess of 30 inches in height. Toeboards are to be provided if the height of the platform exceeds 6 feet. Stairways (to platform) having four risers or more are to be equipped with handrails. Handrails are not required if the platform is less than 30 inches high.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ELECTRICAL SAFETY

NUMBER: 28

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 12, 1994

1.0 POLICY

EARTH TECH will follow standards set by the National Electrical Code and OSHA in selection of materials and methods of installation and maintenance. Only qualified personnel will work on electrical equipment.

2.0 PURPOSE

This procedure specifies the requirements for electrical equipment.

3.0 GENERAL REQUIREMENTS

- 3.1 No electrical work should be done "hot" if it can be done "cold."
- 3.2 Hot line work will be done only under specific authorization and direction from the site supervisor.
- 3.3 Approved rubber protection and "hotsticks" will be used as specified by the site supervisor.
- 3.4 Use proper clearance and grounding procedures and, when possible, all electrical circuits and equipment shall be de-energized before maintenance and repair work are started.
- 3.5 Single-phase electric hand tools and other single-phase, portable electrical equipment must be approved by Underwriters Laboratories, or another recognized testing agency, and all exposed non-current-carrying metal parts must be grounded or be double insulated.
- 3.6 Before each use, portable electrical appliances are to be examined for obvious deficiencies in the appliance, cord, or plug. If any deficiency is noted, the appliance is not to be used.
- 3.7 Extension cords are to be kept clean, dry and free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or become a tripping hazard.

4.0 PORTABLE ELECTRICAL EQUIPMENT

- 4.1 Double insulated portable industrial type electrical tools meeting the requirements of the National Electrical Code are authorized for use (ground wire not required). Where such a system is employed, the equipment must be distinctly marked.
- 4.2 Portable electrical tools not provided with special insulating or grounding protection are not intended for use in damp, wet, or conductive locations (persons standing on the ground or on metal floors).
- 4.3 All portable electrical appliances and equipment where the non-current-carrying metal parts are exposed to contact by personnel shall be grounded by continuous conductor of adequate

HEALTH AND SAFETY PROCEDURES

| | | |
|-----------------------------------|--------------------------------|---------------|
| SUBJECT: ELECTRICAL SAFETY | NUMBER: 28 | PAGE: 2 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 12, 1994 | |

capacity from the device to a grounded receptacle. The Site Safety Officer shall resolve any question which arises as to whether or not a particular appliance should be grounded.

4.4 Grounding of receptacles shall be accomplished in one of two ways:

4.4.1 A built-in ground wire of green color may be attached to the ground pole of the receptacle.

4.4.2 The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts.

4.5 At outside construction sites all single-phase 15 and 20 ampere receptacle outlets operating at 230 volts or less which are not a part of the permanent wiring of the building or structure must have ground-fault circuit interrupters for personnel protection.

4.6 The outlet box for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.

5.0 ELECTRICAL GUARDING

5.1 Suitable access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.

5.2 The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment which require examination, adjustment, servicing, or maintenance while energized, shall not be less than 36" in depth (30" for installations built prior to 1981) and the width being 30" or the width of the equipment, whichever is greater.

5.2.1 The working space shall not be used for storage purposes. The "keep clear" area may be identified with suitable floor markings and/or posting of signs or decals on the equipment.

5.3 Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures.

5.3.1 Entrance to rooms and other guarded locations containing exposed energized parts shall be marked with a conspicuous warning sign forbidding unqualified persons to enter.

5.3.2 Temporary covers, warning signs, and/or barricades are to be used when it is necessary to remove covers of electrical panels during construction, major refurbishment, or for the purpose of providing temporary power to an area.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ELECTRICAL SAFETY

NUMBER: 28

PAGE: 3 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 12, 1994

- 5.4 All openings in boxes, enclosures, or fitting shall be effectively guarded or closed to afford protection substantially equivalent to that of the wall of the box, enclosure, or fitting.

INFORMS/SOP/ELECTRIC.28

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: SOLVENTS, FLAMMABLES, AND COMPRESSED GASES | NUMBER: 29 | PAGE: 1 OF: 7 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: July 1995 | |

1.0 POLICY

EARTH TECH policy is to protect employees against exposures to concentrations above the TLV. All employees must be familiar with and comply with the provisions of this procedure.

2.0 PURPOSE

This procedure outlines general precautions that are to be taken by personnel when handling solvents, compressed gases, and/or flammable liquids. Precautions and required protective equipment for specific chemicals or gases are included in Material Safety Data Sheets and Site Safety Plans.

3.0 DEFINITIONS

- 3.1 Hydrocarbon solvents are compounds consisting solely of hydrogen and carbon atoms. They are flammable in varying degrees and may leave a combustible residue or oily film.
- 3.2 Alcohols are hydrocarbon derivatives in which one or more hydrogen atoms have been replaced by a hydroxyl group (oxygen-hydrogen). They are flammable, water soluble, and leave no film.
- 3.3 Ketones are hydrocarbon derivatives containing oxygen atoms. They are flammable, water soluble, and dissolve some materials not affected by hydrocarbons or alcohols.
- 3.4 Halogenated hydrocarbons are organic compounds containing chlorine, fluorine, and/or other halogens. They are primarily non-flammable and leave no oily residue. Depending on their boiling point, they are used cold or in heated vapor degreasers. When exposed to flames, hot surfaces, or welding arcs, vapors of these materials decompose into highly toxic and corrosive vapors, such as phosgene or hydrogen chloride.
- 3.5 Flammable solvents are classified according to flash points and boiling points (see Section 6 of this procedure).
- 3.6 TLV is the abbreviation for "threshold limit value." Atmospheric contaminants are generally expressed as parts per million (ppm) denoting parts of the material in 1,000,000 parts of air. Threshold limit values are the ppm limits set by the American Conference of Governmental Industrial Hygienists which most employees may be continuously exposed during their 8-hour working days without any adverse effect on their health.
- 3.7 Boiling point is that temperature at which a liquid boils and is an indicator of the relative vapor concentrations present over liquids at any given temperature. (The higher the boiling point, the lower the vapor concentration.)
- 3.8 Flash point is that temperature at which sufficient flammable vapors are evolved from a liquid to enable ignition. (The lower the flash point, the more flammable the solvent.)

HEALTH AND SAFETY PROCEDURES

SUBJECT:

SOLVENTS, FLAMMABLES, AND COMPRESSED GASES

NUMBER: 29

PAGE: 2 OF: 7

DATE PUBLISHED: April 23, 1991

DATE REVISED: July 1995

- 3.9 Flammability limits denote the range, in percentage mixtures, of the material which will burn with air, or, if confined and ignited, will explode.
- 3.10 Positive ventilation is venting provided by ducting and fans or blowers as opposed to "comfort," or natural ventilation.
- 3.11 Safety containers are of welded seam construction with excess pressure relieving closure and wire mesh screens to prevent the propagation of flame into the container. Safety containers are painted red (some have one yellow stripe). The container must be plainly labeled as to contents.

4.0 SOLVENTS

- 4.1 All solvents remove protective oils from the skin on contact, increasing the possibility of dermatitis and infection. Some solvents may be absorbed through the skin to produce systemic effects.
 - 4.1.1 Repeated skin contact can cause a person to become sensitized to a given solvent.
- 4.2 All solvents have varying adverse effects if ingested. Hydrocarbon liquids produce respiratory complications if allowed to enter the lungs.
- 4.3 Vapor concentrations above a given solvent are highly difficult to predict, depending on the method of dispensing, agitation, temperature, air movement, and confinement. In any case, the concentration will be directly proportional to the area of the surface wetted under a given set of conditions.
- 4.4 Some of the solvent vapors may be detected by odor before the TLV is reached. However, this is not a reliable method for protection against overexposure, since some solvents paralyze the sense of smell.
- 4.5 Miscellaneous solvent supplies in work areas shall be reduced to the minimum amount necessary for daily operation.
- 4.6 Solvent containers for bench use shall be of smallest practical size and shall provide a method of dispensing without pouring (by wetting cloth, squeeze bottle, or plunger type safety container).
- 4.7 All wiping cloths used for solvents shall be placed in a closed container immediately after use.
- 4.8 Disposition of all solvent wastes must be by an environmentally approved method.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

SOLVENTS, FLAMMABLES, AND COMPRESSED GASES

NUMBER: 29

PAGE: 3 OF: 7

DATE PUBLISHED: April 23, 1991

DATE REVISED: July 1995

- 4.9 Spills shall be cleaned up immediately using respiratory protection. Clear the area of other persons as necessary.
- 4.10 No solvent shall be used in a fashion to permit skin contact with the liquid. In most instances this means that gloves must be worn.
- 4.10.1 Solvent-contaminated clothing must be removed at once.
- 4.11 All use of solvent not in positively vented equipment or in an outside area shall require the use of respiratory protection.
- 4.11.1 When using solvents inside a pit or confined area, regardless of quantity, personnel must wear level B protection and comply with confined space entry procedures.
- 4.12 Containers of solvents shall be labeled with an appropriate warning label.
- 4.13 The following precautions must be observed when opening full drums of solvents or chemicals:
- 4.13.1 When opening full drums, all personnel in the immediate area must wear chemical goggles or a face shield.
- 4.13.2 When removing the bung, the barrel must be in an upright position and a proper bung wrench used. The bung is to be loosened one turn, internal drum pressure allowed to reach atmospheric pressure, and then the bung may be removed. Never place head or face above a bung when opening.

5.0 FLAMMABLE

5.1 General Information

5.1.1 Definitions

- Class I Flammable: Includes those having a "flash point" below 100°F.
- Class II Combustible Liquids: Includes those having a "flash point" at or above 100°F, but below 140°F.
- Class III Combustible Liquids: Includes those having a "flash point" above 140°F, but below 200°F.

- 5.1.2 Handling and storing of flammable liquids in closed or approved safety containers and avoiding exposure of the liquid surface to air are of fundamental importance.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: SOLVENTS, FLAMMABLES, AND COMPRESSED GASES | NUMBER: 29 | PAGE: 4 OF: 7 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: July 1995 | |

5.1.3 Placards for flammable or combustible liquids are as follows:

- "Flash point" of 20°F or below: "DANGER! EXTREMELY FLAMMABLE."
- "Flash point" from 20°F to 100°F: "WARNING! FLAMMABLE."
- "Flash point" from 100°F to 200°F: "CAUTION! COMBUSTIBLE."

5.2 HANDLING AND DISPENSING

5.2.1 Drums in storage racks are to be minimum of 50 feet from the nearest structure. All drums are to be electrically grounded. Drip trays are to be provided under drum spigots.

5.2.2 A bond (metal-to-metal) is to be established between the container and drum prior to filling a container from the storage drum. Drums are to be equipped with an approved type safety faucet and flexible metal hose. A pressure-vacuum relief vent is required for drums of flammable liquids. Metal-to-metal contact may also be established by using a grounding strap.

5.2.3 Except in unusual cases as approved by the Regional Health and Safety Manager, the maximum amount of flammable solvent (used for cleaning purposes) at any work station is limited to one quart.

5.3 Maximum use must be made of fireproof metal cabinets to store flammable liquids inside any maintenance shop or area.

5.4 Rags, kinwipes, etc., that are contaminated with flammable liquids are to be placed in a safety container equipped with a fusible link lid.

5.5 All containers of flammable liquids must be properly identified as to contents.

5.6 Spill containment is required for all drum (solvent) dispensing areas. The secondary containment dike will be designed for 110 percent of the aboveground storage tank (AST) volume with the ability for 24-hour holding time.

5.7 All manually handled flammable liquids shall be handled in approved safety containers. The exception is pint-sized squirt bottles.

5.7.1 Where flammable solvents must be used in wash containers, such as for paint sprayer cleaning, the container must be provided with selfclosing or fusible like closure.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: SOLVENTS, FLAMMABLES, AND COMPRESSED GASES | NUMBER: 29 | PAGE: 5 OF: 7 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: July 1995 | |

- 5.8 Flammable liquid in portable containers in excess of the daily supply must be stored in approved flammable liquid storage cabinets maintained closed with the door latched each time after use.
- 5.9 Containers of flammable liquids shall be labeled with an appropriate warning label.
- 5.10 "NO SMOKING" signs are to be posted in areas where flammable liquids are stored, dispensed, or used.
- 5.11 Additional information and requirements for handling and storage of specific flammable liquids are included in the Material Safety Data Sheets or Site Safety Plans.

6.0 USE OF COMPRESSED AIR OR GASES

- 6.1 Compressed air or other compressed gases in excess of 10 psi are not to be used to blow dirt, chips, or dust from clothing while it is being worn.
- 6.2 Compressed air or gases are not to be used to empty containers of liquids where the pressure can exceed the safe working pressure of the container.
- 6.3 The use of compressed air is to be controlled, and proper personal protective equipment or safeguards utilized, as to protect against the possibility of eye injury to the operator or other persons.
 - Compressed air used for cleaning (except clothing) is to be limited to 30 psi.
- 6.4 Compressed gases are not to be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the pressure with a safety factor of at least four.

7.0 COMPRESSED GASES (CYLINDERS)

- 7.1 Cylinders must never be dropped, struck, or permitted to strike each other violently. Cylinders may be moved by tilting and rolling them on their bottom edges.
- 7.2 Valve protection caps must always be kept on cylinders when they are being moved, stored, or until ready for use.
- 7.3 Cylinder valves are to be kept closed except when gas is being used or when connected to a permanent manifold. Valves of empty cylinders must be closed.
- 7.4 Cylinders must never be used as rollers or supports, or for any purpose other than carrying gas.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: SOLVENTS, FLAMMABLES, AND COMPRESSED GASES | NUMBER: 29 | PAGE: 6 OF: 7 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: July 1995 | |

- 7.5 Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high temperature steam lines.
- 7.6 Cylinders are to be stored in an assigned area with full and empty cylinders separated. Stored fuel gases and oxygen cylinders are to be separated by 20 feet, or by a fire wall at least 5 feet high having a fire-resistance rating of at least one-half hour.
- 7.7 Oxygen, nitrogen, helium, or freon cylinders may be stored or transported either in an upright or horizontal position. Acetylene cylinders must always be kept in an upright position. All horizontally placed cylinders are to be secured by chocks or ties to prevent rolling.
- 7.8 Cylinders are to be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap is not to be removed or the cylinder valve opened until the cylinder is secured.
- 7.9 Repair of leaks must never be attempted on a pressurized system. System pressure should be reduced to atmospheric pressure as rapidly as possible, and the supervisor notified immediately.
- 7.10 Compressed gas (in cylinders) must never be used to clean clothing or work surfaces.
- 7.11 Identification of the gas to be used must always be ensured before connecting cylinders for use. All cylinders are to be labeled as to contents in addition to proper color coding.
- 7.12 Compressed gas cylinders in portable service are to be conveyed by suitable trucks to which they are securely fastened. All gas cylinders in service must be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.
- 7.13 Gas cylinders moved by hoist must be handled in suitable cradles or skip boxes. The use of slings must be designed for that purpose.
- 7.14 Cylinders must not be placed where they might form part of an electrical circuit.
- 7.15 Transfer of acetylene from one cylinder to another, or mixing of gases in a cylinder, is prohibited.
- 7.16 Oxygen cylinders are never to be stored near:
- Highly combustible materials, especially oil and grease;
 - Reserve stocks of acetylene or other fuel gas cylinders; and/or

HEALTH AND SAFETY PROCEDURES

SUBJECT:

SOLVENTS, FLAMMABLES, AND COMPRESSED GASES

NUMBER: 29

PAGE: 7 OF: 7

DATE PUBLISHED: April 23, 1991

DATE REVISED: July 1995

- Any other substance likely to cause or accelerate fire.
- 7.17 Cylinders are not to be used unless they bear D.O.T. markings showing that they have been tested as required by D.O.T. regulations.
- 7.18 Compressed gas cylinders must be legibly marked for the purpose of identifying the gas content with either the chemical or the trade name of the gas. Such marking is to be by means of stenciling, stamping or labeling, and must not be readily removable. Whenever practical, the marking is to be located on the shoulder of the cylinder.
- 7.19 Compressed oxygen is never to be used:
- as breathing air;
 - to purge pipelines, tanks, or any confined area;
 - to supply a head-pressure tank;
 - in pneumatic tools;
 - in oil preheating burners;
 - to start internal combustion engines;
 - for ventilation;
 - for cleaning clothing; and/or
 - in any other way as a substitute for compressed air.
- 7.20 Use of a cylinder's contents for purposes other than those intended by the supplier is prohibited.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

PORTABLE FIRE EXTINGUISHERS

NUMBER:30

PAGE: 1 OF: 1

DATE PUBLISHED:April 23, 1991

DATE REVISED:May 6, 1994

1.0 POLICY

Portable fire extinguishers shall be maintained in a state of readiness at all times. This applies to job sites, shops, and offices.

2.0 PURPOSE

This procedure describes requirements for the upkeep of portable fire extinguishers.

3.0 REQUIREMENTS

- 3.1 All fire extinguishers in offices in shops (for shop use) are to be mounted on walls.
- 3.2 The area adjacent to the mounted fire extinguishers is to be kept free of obstructions.
- 3.3 An inventory of all fire extinguishers is to be maintained by each office or shop. A checklist is included to ease this task.
- 3.4 Brief inspections are to be conducted monthly and documented on the checklist.
- 3.5 Any fire extinguisher not meeting the prescribed criteria shall be removed from service until the deficiencies are corrected.

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PORTABLE FIRE EXTINGUISHER CHECKLIST

OFFICE/SHOP LOCATION _____

INVENTORY

| Serial # | Location | Serial # | Location |
|----------|----------|----------|----------|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

Inspection Points

1. Fire extinguisher in assigned location*.
2. Access is not obstructed.
3. Fire extinguisher is fully charged.
4. Lock-pin in place.
5. Test tag is attached and current.

* Signify Site dedicated extinguishers by an (s)

INSPECTIONS COMPLETED

Month/Initials

| | | | |
|----------------|-------------|-----------------|----------------|
| January _____ | April _____ | July _____ | October _____ |
| February _____ | May _____ | August _____ | November _____ |
| March _____ | June _____ | September _____ | December _____ |

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ASBESTOS

NUMBER: 31

PAGE: 1 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

EARTH TECH will engage in investigations, engineering, sampling and abatement activities related to asbestos containing materials (ACMs), only when employees are adequately trained and all activities comply with applicable regulatory requirements.

2.0 PURPOSE

This procedure describes basic policy for ACM activities.

3.0 REQUIREMENTS

- 3.1 No work of any kind is to be conducted involving ACMs unless the employee has been trained in compliance with OSHA regulations (29 CFR 1926.58 and 29 CFR 1910.1001). Additionally, many types of asbestos- related work require training under the Asbestos Hazard Emergency Response Act (AHERA). As a general rule AHERA training shall be obtained. An 8-hour annual refresher class is also required.
- 3.2 Any employee conducting supervisory work on an ACM project will comply with the same requirements as the personnel conducting the work. This includes training, medical surveillance and protective equipment.
- 3.3 Several states have registration or certification requirements. Necessary local documentation will be acquired prior to initiating work.
- 3.4 A Site Safety Plan will be prepared for all ACM projects.
- 3.5 All other applicable health and safety procedures shall be enforced on ACM projects.

4.0 MEDICAL REQUIREMENTS

Asbestos related work requires slightly different medical surveillance procedures than for hazardous waste activities. These requirements are as follows:

- 4.1 A medical surveillance program is required for employees who are:
 - Exposed to asbestos at or above the action level (0.1 fiber > 5 micron/cc) for 30 or more days per year; and/or
 - Required to wear negative pressure respirators to protect against asbestos

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ASBESTOS

NUMBER: 31

PAGE: 2 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

4.2 Medical exams shall be conducted:

- Prior to assignment to an area requiring negative pressure respirators;
- Prior to assignment to an area where the action level may be exceeded;
- At least annually thereafter;
- More frequently, if the examining physician deems it advisable for medical reasons; and
- Within 30 days before or after the date of termination of employment for any employee who has been exposed at or above the action level.

4.3 EARTH TECH is responsible for providing the physician:

- A copy of the OSHA asbestos standards (29 CFR 1910, 1001 and 29 CFR 1926.58) and Appendices D, E and I;
- The employee's representative or anticipated exposure level;
- Site health and safety plan;
- A description of personal protective equipment to be used; and
- Information from previous examinations which may not be readily available to the physician.

4.4 The medical exam shall include:

- A medical and work history;
- A complete physical exam with emphasis on the respiratory system, cardiovascular system and respiratory tract;
- Completion of the standardized questionnaire in Appendix D of the OSHA standard;
- Pulmonary function test;
- Chest X-ray or initial exam. Periodic chest X-rays will be administered as deemed necessary by the physician or according to the following chart as a minimum:

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ASBESTOS

NUMBER: 31

PAGE: 3 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

| Years Since Employee First Exposed | Age of Employee | | |
|---------------------------------------|-----------------|---------------|---------------|
| | 15 - 35 | 35 - 45 | 45 plus |
| 0 - 10 | every 5 years | every 5 years | every 5 years |
| 10 plus | every 5 years | every 2 years | every year |

4.5 EARTH TECH shall obtain and furnish the employee with a written copy of the physician's written opinion containing:

- Results of physical exam and tests;
- Physician's opinion as to any detected medical conditions which would place the employee at increased risk of health impairment;
- Physician's recommended limitations upon the employee's assigned work or use of personal protective equipment; and
- A statement that the employee has been informed by the physician of the results of the medical exam and any medical conditions resulting from asbestos exposure which may require further explanation or treatment.

5.0 RESPIRATORY PROTECTION

The OSHA standard for asbestos (29 CFR 1926.58 n) contains specific requirements for respirator usage in addition to the EARTH TECH basic program.

- 5.1 Respirator cartridges will, at a minimum, be changed on a daily basis. Additionally, cartridges will be changed whenever there is an increase in breathing resistance.
- 5.2 Employees may choose a powered air purifying respirator whenever a negative pressure respirator is required.
- 5.3 Respirators will be chosen based on the airborne levels measured or anticipated according to the following table:

HEALTH AND SAFETY PROCEDURES

SUBJECT:

ASBESTOS

NUMBER: 31

PAGE: 4 OF: 4

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

Not in excess of 2 f/cc (10 X PEL):

1. Half-mask air-purifying respirator equipped with high-efficiency filters.

Not in excess of 10 f/cc (50 X PEL):

1. Full facepiece air-purifying respirator equipped with high-efficiency filters.

Not in excess of 20 f/cc (100 X PEL):

1. Any powered air-purifying respirator equipped with high-efficiency filters; and
2. Any supplied-air respirator operated in continuous flow mode.

Not in excess of 200 f/cc (1000 X PEL):

1. Full facepiece supplied-air respirator operated in positive pressure mode.

Greater than 200 f/cc (> 1,000 X PEL) or unknown concentration

1. Full facepiece supplied air respirator operated in pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

5.4 Employees will be allowed to leave work areas to wash their faces whenever necessary to prevent skin irritation.

5.5 Fit testing will be repeated every 6 months for negative pressure respirators. Fit testing will use either isoamyl acetate or irritant smoke per Appendix C to 29 CFR 1926.58.

FORMS/SOP/ASBESTOS.31

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONSTRUCTION/DEMOLITION

NUMBER: 32

PAGE: 1 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

EARTH TECH and its contractors will provide a safe work place for construction/demolition activities in compliance with this procedure, this manual, and all applicable regulations.

2.0 PURPOSE

This procedure provides fundamental safety rules specifically addressing construction/demolition projects.

3.0 JOB SAFETY PLANNING

3.1 In preparing the estimate, a realistic sum of money for safety requirements in accordance with conditions, company safety policies, Federal and state safety and health regulations, owner, and other regulatory agency specifications is to be included.

3.2 Hold a pre-job planning meeting soon after contract award to discuss:

3.2.1 Owner, company, and regulatory agency requirements.

3.2.2 Hazards and control measures involving EARTH TECH or Contractor employees, equipment and materials. Refer to the Federal and state safety and health regulations for specific requirements to include the following topics:

- Personal protective equipment required;
- Lighting for night operations;
- Fire prevention, fire fighting equipment;
- Ladders, scaffolds, nets, overhead protection and other temporary structure safety requirements;
- First aid and medical requirements;
- Traffic patterns, haul road layout, designated parking areas;
- Sanitary requirements, drinking water; and
- Security.

3.2.3 Hazards and control measures involving members of the public and/or their property. Address the following:

- Public vehicular traffic exposure - need for signs, barricades, flashers, flagmen, detours, traffic lights;
- Public pedestrian and children - need for temporary walkways, overhead protection, watchmen, securing equipment, fencing and other methods of protection and denial of access;

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONSTRUCTION/DEMOLITION

NUMBER: 32

PAGE: 2 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- Railroad - protection required, notification to railroads of our operation, securing train schedules, flagmen, signs, warning signals, reduced speed, special insurance;
- Utilities - underground and overhead-locating and marking, notification of schedules, special insurance; and
- Use of flashing yellow lights on equipment working in and around traffic.

3.2.4 Prepare a site safety plan to be used as a guide in ordering safety documents and in developing the safety program at the start of the job.

3.2.5 Order safety equipment to arrive ahead of need. Spell out safety features desired on new equipment being purchased. Check rented equipment before making agreements to be sure equipment has essential safety features.

3.3 Review Site Safety Plan:

3.3.1 Status of safety equipment ordered.

3.3.2 Any changed conditions and effect on safety requirements.

3.3.3 Notifications to railroads, utility companies.

3.3.4 Contacts with insurance carrier to obtain their recommendations.

3.4 Safety inspection of equipment: correct deficiencies before equipment goes to work. Required safety features must be installed on rented units.

3.5 Review safety program with subcontractors to familiarize them with requirements for safety. Give them a copy of the written program.

4.0 ORIENTATION OF JOB SITE PERSONNEL

4.1 Each employee is to be instructed in the recognition and avoidance of unsafe conditions and the regulations applicable to his/her work environment to control or eliminate hazards or exposures to illness and injury.

4.2 The following paragraphs describe the methods to be used and records to be maintained in the indoctrination session and tailgate meetings.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: CONSTRUCTION/DEMOLITION | NUMBER: 32 | PAGE: 3 OF: 6 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

4.2.1 New employees working in non-office environments shall be provided indoctrination as to the company safety program, job site rules and safety rules pertaining to the job assignments prior to beginning work. This orientation shall be conducted by personnel knowledgeable in the requirements.

4.2.2 Upon completion of the review of the site safety plan, workers will sign the acknowledgement.

5.0 PROTECTION OF THE PUBLIC

All necessary precautions shall be taken to prevent injury to the public or damage to property of others. Precautions to be taken shall include, but are not limited to, the following:

- 5.1 Work shall not be performed in any area occupied by the public unless specifically permitted by the contract or in writing by the construction manager.
- 5.2 When it is necessary to maintain public use of work areas involving sidewalks, entrances to buildings, lobbies, corridors, aisles, stairways and vehicular roadways, trade contractors shall protect the public with appropriate guardrails, barricades, temporary fences, overhead protection, temporary partitions, shields and adequate visibility.
- 5.3 Sidewalks, entrances to buildings, lobbies, corridors, aisles, doors or exits shall be kept clear of obstructions to permit safe entrance and exit of the public at all times.
- 5.4 Appropriate warnings and instructional safety signs shall be conspicuously posted where necessary. In addition, a signalman shall control the movement of motorized equipment in areas where the public might be endangered.
- 5.5 Sidewalks, sheds, canopies, catch platforms and appropriate fences shall be provided when it is necessary to maintain public pedestrian traffic adjacent to the erection, demolition or structural alternation of outside walls on any structure.
- 5.6 A temporary fence shall be provided around the perimeter of above ground operation adjacent to public areas. Perimeter fences shall be at least 6 feet high.

They may be constructed of wood or metal frame and sheathing, wire mesh, or a combination of both. When the fence is adjacent to a sidewalk near a street intersection, at least the upper section of fence shall be open wire mesh from a point not over 4 feet above the sidewalk and extending at least 25 feet in both directions from the corner of the fence or as otherwise required by local conditions.

Guardrails shall be provided on both sides of vehicular and pedestrian bridges, ramps, runways, and platforms. Pedestrian walkways elevated above adjoining surfaces, or walkways within 6 feet of the top of excavated slopes or vertical banks shall be protected

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONSTRUCTION/DEMOLITION

NUMBER: 32

PAGE: 4 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

with guardrails. Guardrails shall be made of rigid materials capable of withstanding a force of at least 200 pounds applied in any direction at any point in their structure. Their height shall be approximately 42 inches. Top rails and posts may be 2 inches by 4 inches dressed wood or the equivalent. Intermediate horizontal rails at mid-height and toe boards at platform level may be 1 inch by 6 inch wood or the equivalent. Posts shall not be more than 8 feet apart.

- 5.7 Barricades, where required, shall be secured against accidental displacement and shall be *maintained in place* except where temporary removal is necessary to perform the work. While a barricade is temporarily removed for the purpose of work, a watchman shall be placed at all openings.
- 5.8 Temporary sidewalks shall be provided when a permanent sidewalk is obstructed by the trade contractor's operation. They shall be installed in accordance with the requirements listed above.
- 5.9 Warning lights shall be maintained from dusk to sunrise around excavations, barricades or obstructions in plant areas. Illumination shall be provided from dusk to sunrise for all temporary walkways in both plant and construction areas.

6.0 HOUSEKEEPING

A basic concept in any effective prevention endeavor is good housekeeping. No one item has a greater impact on the overall success of a safety program for a construction project.

The importance of good housekeeping is such that it must be planned for from the beginning to the final clean-up. The degree of attention given to housekeeping will normally be reflected in the *accident record, as well as in construction efficiency.*

- 6.1 During the course of construction, work areas, passageways, and stairs in and around buildings and structures shall be kept clear of debris. Construction materials shall be stored in an orderly manner. Storage areas and walkways on the site shall be maintained free from dangerous depressions, obstructions, and debris.
- 6.2 The essential elements of good housekeeping are:
- Orderly placement of materials, tools, and equipment;
 - Placing receptacles at appropriate locations for the disposal of miscellaneous rubbish;
 - Prompt removal and disposal of trash and waste materials; and
 - Locating air and water lines, welding leads, and burning hose in positions that eliminate tripping hazards.

HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: CONSTRUCTION/DEMOLITION | NUMBER: 32 | PAGE: 5 OF: 6 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

7.0 SCAFFOLDING

- 7.1 The footings and anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- 7.2 A safe means of access to and egress from the work level must be provided. Ladders used for access/egress must be secured at top and bottom. Ladder frame scaffolds must not be offset or used with other scaffold frames.
- 7.3 No scaffold shall be erected, moved, dismantled, or altered, except under the supervision of competent persons.
- 7.4 Scaffolds and their components shall be capable of supporting without failure at least four times their maximum intended load.
- 7.5 Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor.

8.0 WORK AREA PROTECTION

- 8.1 Any open area 4 or more feet above adjacent surfaces shall be protected by a substantial guardrail able to resist 200 lbs. of horizontal force, a steel perimeter cable, or a warning system such as flagging or caution tape installed a minimum of 6 feet from the surface's exposed edge.
- 8.2 Floor openings through which personnel or material can pass should be protected by a cover or barricade, substantial enough to withstand any anticipated load. Covers shall be anchored and identified to prevent accidental removal or displacement.
- 8.3 Warning signs, barricades, and flagging are to be used to warn personnel of potential or hidden hazards or advise of intermittent activities which might endanger outside personnel. They are not to be used in lieu of more effective protection.
- 8.4 Adequate ventilation or localized exhaust may be required to satisfy the work environment requirement of OSHA (1926.55, 57). Such equipment as is necessary shall be furnished by the trade contractor unless other arrangements have been made in writing.
- 8.5 If temporary illumination furnished by others is inadequate, the trade contractor is responsible to notify the construction manager of these deficiencies.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONSTRUCTION/DEMOLITION

NUMBER: 32

PAGE: 6 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 8.6 Protection of vertical rebar. Employees shall not be permitted to work above vertically protruding reinforcing steel unless it has been covered or protected to eliminate the hazard of persons falling on it and being impaled.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 1 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

Concern for safe operation of vehicles cannot be overemphasized. Vehicle operations represent perhaps one of the greatest potentials for serious loss because the public is involved and court awards to injured parties can be staggering. It is essential, therefore, that Earth Tech have an effective, well-organized Vehicle Safety Plan.

2.0 PURPOSE

This procedure establishes requirements for safe operation of vehicles and equipment.

3.0 REQUIREMENT - VEHICLES

- 3.1 All vehicles operated in interstate transportation are subject to the Interstate Commerce Commission and Bureau of Motor Carrier Safety Regulations. Measures shall be established to assure that drivers and equipment meet those regulatory requirements.
- 3.2 The Earth Tech Shop Manager is responsible for the following:
 - 3.2.1 Providing interface with the Corporate Health and Safety Officer.
 - 3.2.2 Assuring that all vehicle accident reports from all jobs are processed and the required number of copies submitted to local, state, and Federal agencies, to the Corporate Health and Safety Officer, and to the insurance carrier.
 - 3.2.3 Assuring that Corporate Health and Safety Officer is notified by telephone of accidents that involve fatalities or multiple serious injuries.
 - 3.2.4 Selection of only highly qualified drivers.
 - 3.2.5 Establishing and conducting a training program, if required.
 - 3.2.6 Investigation of all accidents to establish the when, where, and why the accident occurred and for assuring action to prevent recurrence.
- 3.3 All accidents shall be documented and investigated by supervisory personnel. The investigation should be of sufficient depth to determine the cause and action required to prevent recurrence. Copies of all motor vehicle accident reports shall be forwarded to health and safety and the insurance carrier.

4.0 REQUIREMENTS - EQUIPMENT

- 4.1 General - The following safety rules apply to all types of operators.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 2 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 4.1.1 Air Hose and Couplings - Periodically check air compressor hoses for worn or damaged parts. Do not crimp air hose to disconnect couplings; shut off air at the valve.
- 4.1.2 Backing Up - Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.
- 4.1.3 Boots and Shoes - Wear sturdy work shoes or boots. Hobnailed boots or shoes should not be worn due to the slipping and snagging hazard they present.
- 4.1.4 Cranking - When crank starting a motor, place thumbs next to the index fingers and not around the crank handle. Pull up on the crank - never push down. This method avoids injury in case of engine kickback.
- 4.1.5 Ear Protection - Ear plugs or other approved ear protection shall be worn when necessary.
- 4.1.6 Emergency Vehicles - Give ambulances, fire fighting equipment and other vehicles the right-of-way during emergencies and lend assistance if required.
- 4.1.7 Fueling and Repair - No fueling or repair shall be made to equipment while it is in operation. The motor shall be turned off and the bucket, blade, gate or boom shall be lowered to the ground or blocks.
- 4.1.8 Gasoline - Gasoline and other combustible liquids shall not be carried in or on vehicles other than in permanent gas tanks or in approved safety cans.
- 4.1.9 Gloves - Heavy gloves should be worn when handling wire rope and other rough materials.
- 4.1.10 Housekeeping - Operators should keep deck plates, steps, rung and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.
- 4.1.11 Inspections - Inspect the unit to which you are assigned to make sure it is in safe operating condition. These inspections shall be made at least at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately. Equipment forms are available to record this data (EQ Form 505). Equipment and vehicles shall not be used until defects or discrepancies are repaired unless they do not affect the safe operation of the equipment or vehicle.
- 4.1.12 Jumping - Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 3 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 4.1.13 Know Your Equipment or Vehicle - It is your responsibility to be thoroughly familiar with all feature plates and manuals and, if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.
- 4.1.14 Laws and Regulations - Learn and obey all local, state, and Federal laws and the client's stipulations.
- 4.1.15 Moving Equipment - Do not attempt to get off or on any equipment or vehicle while it is in motion.
- 4.1.16 Overloading - Avoid overloading vehicle beds and equipment buckets and beds. Excessive material can damage the unit and falling material can cause serious injury.
- 4.1.17 Parking - Equipment and vehicles shall be parked off roads and highways whenever possible. When it is not possible, the unit shall be marked by red lights or flares at night and red flags during the day. Wheels should be blocked.
- 4.1.18 Passing - Do not pass when visibility is restricted for any reason.
- 4.1.19 Pedestrians - Be constantly alert for pedestrians. Remember they have the right-of-way.
- 4.1.20 Power Lines - When operating high trucks, cranes, shovels or other units, always use caution around power lines and maintain a safe clearance of 10 feet or more depending upon the voltage.
- 4.1.21 Qualifications - Only fully qualified and authorized personnel shall operate construction equipment or vehicles.
- 4.1.22 Riders - Only authorized persons will be permitted to ride in equipment or vehicles.
- 4.1.23 Seat Belts - If unit is equipped with seat belts, operator and passengers must keep seat belts fastened at all times during operations.
- 4.1.24 Equipment and Vehicle Security -
- All units shall be secured so that they cannot be started or moved by any unauthorized person during off-work hours.
 - All mobile units shall be secured in some way whereby they cannot move freely after they are parked.
 - The key should be removed after securing equipment or vehicle and turned over to an authorized supervisor.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: VEHICLE AND EQUIPMENT OPERATIONS | NUMBER: 33 | PAGE: 4 OF: 9 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

- 4.1.25 Shoulders and Ditches - Do not operate too closely to the edge of shoulders, cuts, fills, or ditches.
- 4.1.26 Slow Down - Slow down and use caution at blind intersections and crossings when visibility is limited or when passing work crews.
- 4.1.27 Smoking - Do not smoke during refueling or servicing operations. Do not throw lighted material from vehicles or equipment.
- 4.1.28 Speeding - Speeding is dangerous and is strictly prohibited.
- 4.1.29 Thumbs Up - Keep thumbs up when driving. Do not grasp the steering wheel with thumbs inside the spokes.
- 4.1.30 Visibility - Make sure all windshields, side and rear windows, mirrors and lights are clean before moving the unit.
- 4.1.31 Warning Signs and Traffic Signals - Be alert for and strictly obey all directional and warning signs and signals.
- 4.2 Trucks, Pickups, and Other Vehicle Operators
 - 4.2.1 Blind Curves - Slow down and sound horn when approaching a blind curve.
 - 4.2.2 Driver's License - Always carry your driver's license with you when operating a vehicle and make sure it is current.
 - 4.2.3 Heavy Rock and Other Material - Do not remain in an open cab truck while it is being loaded with heavy rock or other material presenting a falling hazard. Dismount and move to a safe distance and observe the loading.
 - 4.2.4 Hooks - Hooks or calipers on the "A" frame of trucks should be securely fastened to prevent swinging when not in use. Stand clear of the "A" frame.
 - 4.2.5 Loading - Materials and equipment shall be properly loaded and secured to prevent shifting of loads or loss of material during transit.
 - 4.2.6 Long Hauls - On long hauls, binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.
 - 4.2.7 Overhanging and Oversize Loads - When it is necessary to transport overhanging or oversize loads, the appropriate signs, red flags and red lights will be used. When necessary, use flag cars.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 5 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 4.2.8 Safety Chains - Safety chains of sufficient size and strength shall be installed on all trailers being towed.
- 4.2.9 Safety Hooks - Use safety hooks on all winch truck cables.
- 4.2.10 School Buses - Obey school bus laws. Slow down and prepare to stop when approaching school, buses, children on foot or on bicycles.
- 4.2.11 Side Roads and Railroad Tracks - Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.
- 4.2.12 Stopping - Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.
- 4.2.13 Turn Signals - Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.
- 4.2.14 Vehicle Maintenance - It is the driver's responsibility to see that his or her vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wipers, tires and steering assembly are in good order. Defects must be reported and corrected immediately.
- 4.3 Building Hoist Operators
 - 4.3.1 Communications - Learn and abide by the approved signal system. Have proper communications with all floors as necessary and the ground before operating hoist.
 - 4.3.2 Hoist Platform - Never move the hoist platform unless you understand the proper signal and you are sure the way is clear.
 - 4.3.3 Riders - Do not haul riders on material hoist and do not haul riders and material together on a personnel hoist.
- 4.4 Crane, Shovel and Dragline Operators
 - 4.4.1 Boom Deflection - Keep the boom free of all objects and structures. If boom is allowed to rest against structures, it can cause deflection under load.
 - 4.4.2 Capacity - Do not make lifts exceeding the carrying capacity of crane cables, ropes, and slings.
 - 4.4.3 Control - Make sure you have the load under control when raising and lowering. Use slow, uniform and steady movements for safe, efficient operation.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 6 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 4.4.4 Drums - Do not lower blocks below the point where less than two full wraps of cable remain on the drum.
- 4.4.5 Fire Extinguishers - Each cab-type crane, shovel, or dragline will be provided with a company approved fire extinguisher. Operators are responsible to check these extinguishers daily and to obtain a replacement if defective or after being used.
- 4.4.6 Flammable Liquids - Do not keep gasoline or flammable solvents in crane, shovel, or dragline cabs.
- 4.4.7 Hand Signals - Only the standard hand signals recommended by the International Union of Operating Engineers will be used. These should be posted on the equipment.
- 4.4.8 Hoisting - Start hoisting load slowly and smoothly. Avoid jerking the load as this may throw the crane or shovel off balance. Follow the same procedure when stopping the load.
- 4.4.9 Housekeeping - Keep all deck plates, ladders and walkways on machine clear of oil and grease. Keep walkways and passageways clear of tools and materials.
- 4.4.10 Inclement Weather - Check brakes and hoisting equipment in wet or icy weather before raising a load. Wet frictions frequently cause load slippage. Loads should not be lifted during strong or gusty winds.
- 4.4.11 Level Surface - Keep the rig on a firm, level surface. When the ground is uneven, muddy or soft, mats or timbers will be used to level the rig and to provide a firm foundation from which to work.
- 4.4.12 Loads -
- Do not leave a load hanging or a bucket or clam full of material during lunch or after quitting.
 - Loads should not be held for extensive lengths of time by the brake. "Dog" it off where possible or secure by blocking. Operators must not leave the controls while load is suspended.
 - Make certain the unit and its rigging are capable of handling the intended load at the anticipated radius. Check capacity charts.
 - Raise heavy loads slightly off the ground level and hold long enough to test the rig.

HEALTH AND SAFETY PROCEDURES

| | | |
|--|--------------------------------|---------------|
| SUBJECT: VEHICLE AND EQUIPMENT OPERATIONS | NUMBER: 33 | PAGE: 7 OF: 9 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

- Be sure that the slings are attached to the load properly and that all loose material has been secured or removed before starting to lift.
- 4.4.13 Maintenance - It is the operator's responsibility to see that his or her equipment is in safe working condition prior to and during each shift. Special attention should be paid to brakes, sheaves, cables, hooks, cramps, boom, boom stops, and outriggers. Defects which affect the safe operation of the equipment must be corrected prior to operating the equipment.
- 4.4.14 Operating Boom -
- Use caution when swinging booms. Be constantly alert for other workers in the vicinity of your equipment.
 - Place the load boom directly over the load before starting the hoist to avoid swinging the load.
- 4.4.15 Oilers and Mechanics - Watch out for the oiler or mechanics. They may be green and your instructions or advice may be needed to ensure for their safety.
- 4.4.16 Outriggers - Use outriggers according to the manufacturer's operating recommendation and at all times when the stability of the crane is unknown or questionable.
- 4.4.17 Overhang - Use extreme caution when working close to overhanging material and make sure there is no danger of cave-ins.
- 4.4.18 Power Lines - State and other regulations forbid the operation of booms or other parts of a crane or shovel within specified distances from electric power lines. Know the standard before operating crane or shovel. At no time shall boom or cables be worked within 10 feet of energized power line. Warning decals should be mounted in the cab.
- 4.4.19 Riding - Workers shall not be permitted to ride headache balls, buckets, hooks, or skip boxes except in emergencies or for the purpose of inspection and maintenance and then only under the specific direction of the supervisor.
- 4.4.20 Signalmen - Take signals only from the one person supervising the lift or designated as signalman. Obey a stop signal at all times regardless of who gives it.
- 4.4.21 Suspended Bucket and Boom - Always leave bucket and/or boom in a safe position or lower to a spoil pile. Always place it in a position to avoid a hazard in the work area.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 8 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

4.4.22 Trenches - Avoid placing rigs in close proximity to trenches or embankments where the ground is likely to give way or shift.

4.4.23 Wire Lines - Inspect all cables periodically for wear or fraying. When spooling or reeling cable, never guide moving cable with the hands.

4.5 Front End Loader Operators

4.5.1 Brakes - All loaders will have operable brakes. Faulty brakes shall be reported to your supervisor at once.

4.5.2 Loader Bucket - Loader bucket shall be lowered to the ground when not in use.

4.5.3 Loading - When loading trucks, know what is on the other side of the truck.

4.5.4 Raised Bucket - When traveling with bucket raised, bucket should not be above the top of radiator of the machine where it would obstruct the operator's view.

4.6 Scrapers, Dozers, Tractors, and Other Heavy Equipment Operators -

4.6.1 Clothing - Operators must be careful not to wear loose or torn clothing which can get caught in tracks or other moving parts of the machinery.

4.6.2 Coasting - Never coast with any type of equipment. Always keep the power on and the equipment in gear.

4.6.3 Dozer Blade - Do not use the dozer blade as a brake when coming down a slope or hill, except in case of brake failure.

4.6.4 Hydraulic or Winch Driven Equipment - Dozer and grader blades, ripper teeth, scraper gates and equipment must always be lowered to the ground or blocks when equipment stops or is secured for the shift.

4.6.5 Inclined Surface - Never leave equipment on an inclined surface or on loose material with the motor idling as the vibration may put the machine in motion.

4.6.6 Riders - Operators will not allow riders to ride draw bar, clutch housing, boom or boom winch. Only specifically authorized persons will be allowed to ride jump seats, if equipment is so equipped.

4.6.7 Running Wire - Inspect all cables periodically for wear. When spooling or reeling cable, never guide moving cable with the hands.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

VEHICLE AND EQUIPMENT OPERATIONS

NUMBER: 33

PAGE: 9 OF: 9

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- 4.6.8 Safety Equipment - Check and ensure all guards, canopies, safety bars and other safety equipment are installed and in good order prior to operating equipment.
- 4.6.9 Traveling - When moving equipment, keep dozer blade and scraper bowl close to the ground but high enough to avoid rocks and other obstacles.
- 4.6.10 Winches - Inspect winch brakes, cables and pins periodically. When indicated, have repairs made before using.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

EMERGENCY RESPONSE

NUMBER: 34

PAGE: 1 OF: 2

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 20, 1994

1.0 POLICY

Personnel assigned to emergency response operations will be appropriately trained. Equipment and supplies dedicated to emergency response will not be utilized for day-to-day operations.

2.0 PURPOSE

This procedure describes minimum requirements for emergency response operations involving hazardous materials.

3.0 GENERAL REQUIREMENTS

3.1 Supplies and equipment dedicated to emergency response will not be used in day-to-day operations.

3.1.1 Pollution control trucks will have an inventory of required supplies.

3.1.2 The pollution control truck inventory will be checked after every use and at least monthly. Items not present are to be restocked immediately.

3.1.3 A copy of the inventory and latest inspection is to be kept with the pollution control truck at all times.

3.1.4 Analytical equipment (e.g., HazCat kits and DraNger tubes) will be inventoried monthly or after each use. Deficient or out of date items will be restocked immediately.

3.2 OSHA regulations require that the senior officer responding to an incident involving a hazardous substance or waste will establish an Incident Command System (ICS). All emergency responders and their communications will be coordinated and controlled through the individual in charge of the ICS.

3.3 All emergency response activities will comply with all procedures in this manual.

3.4 A Site Safety Officer will be assigned at all emergency response sites.

4.0 SITE SAFETY PLAN

All emergency response sites will have a site safety plan approved by the Corporate Health and Safety Officer or his/her designee. The site safety plan will consist of the following elements:

4.1 All hazardous substances or conditions will be identified to the extent possible.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EMERGENCY RESPONSE

NUMBER: 34

PAGE: 2 OF: 2

DATE PUBLISHED: April 23, 1991

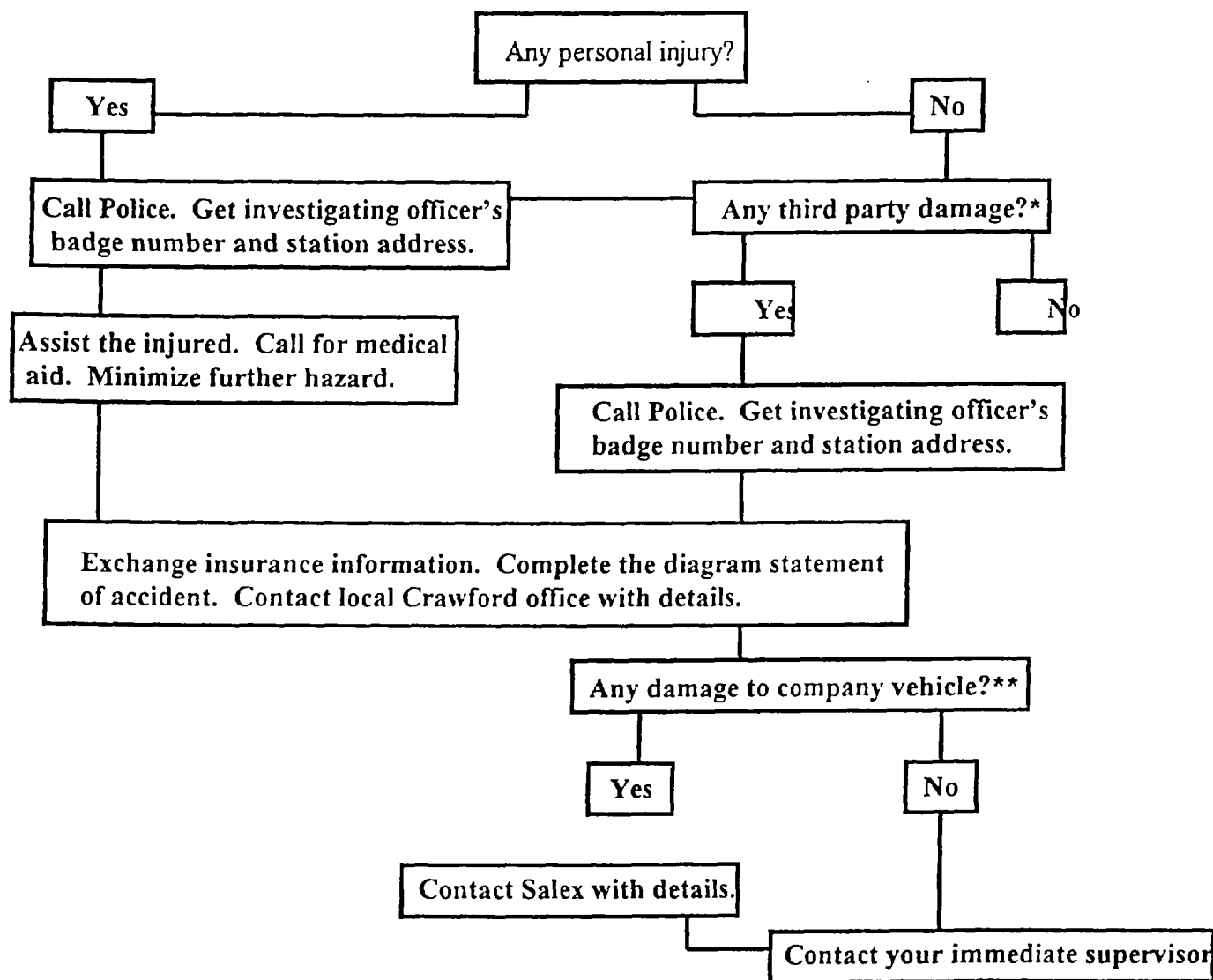
DATE REVISED: May 20, 1994

- 4.2 Appropriate personal protective equipment is to be worn on site and be so specified in the plan:
- Protective clothing;
 - Gloves;
 - Hard hat;
 - Eye protection;
 - Respiratory protection; and
 - Foot protection.
- 4.2.1 An SCBA in the pressure demand mode is to be worn during emergency operations until air monitoring justifies a lower level of protection.
- 4.3 The site supervisor will limit the number of emergency response personnel at the emergency site to those who are actively performing emergency operations. However, operations in hazardous areas will be performed using the buddy system in groups of two or more. Back-up personnel will be standing by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, will also be standing by with medical equipment and transportation capability.
- 4.4 The site safety officer will have the authority to suspend or terminate activities deemed to be unsafe or involve an imminent danger condition.
- 4.5 Work zones will be established per Health and Safety Procedure No. 15.
- 4.6 Decontamination will be mandatory upon leaving the exclusion zone per Health and Safety Procedure No. 16.
- 4.7 Employees involved in emergency response operations will participate in the medical surveillance program per Health and Safety Procedure No. 7.

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tyco

What To Do In the Event of A Crash



* Call Crawford & Company's 24-hour claims service: 1-800-799-TYCO (8926) - Client code 7614

** Call Salex: 1-800-645-4950 (press "1" for Customer Service - Account # 553)

For proper identification when you call, please have your automobile number or serial number ready.

Remember: carry this form, your accident report form, and auto ID card in your glove compartment at all times.

DIAGRAM OF ACCIDENT

Show names of streets and direction in which
vehicles were going. Indicate north, south,
east, west. Show position of vehicles.

STATEMENT OF ACCIDENT

DATE OF ACCIDENT _____ 19__ Time _____ M

WHERE DID ACCIDENT HAPPEN _____

MAKE OF YOUR CAR _____
LICENSE PLATE NO. _____ YEAR/MODEL _____
OWNER'S NAME _____
ADDRESS _____ PHONE _____
AGE _____ LICENSE NO. _____
WHAT PARTS OF YOUR CAR WERE DAMAGED? _____

WHERE CAN CAR BE SEEN? _____

WERE YOU INJURED? _____ WAS ANYONE INJURED? _____
GIVE NAME, AGE AND ADDRESS OF ALL INJURED _____

NATURE OF INJURIES _____

WHERE DOES INJURED PERSON WORK? _____

MAKE OF OTHER CAR _____
LICENSE PLATE NO. _____ YEAR/MODEL _____
OWNER'S NAME _____
ADDRESS _____ PHONE _____
DRIVER'S NAME _____
ADDRESS _____ PHONE _____

DESCRIBE ACCIDENT (INCLUDE SPEEDS AND DIRECTIONS
OF TRAVEL) _____

NAME AND ADDRESS OF ALL WITNESSES (INCLUDE ALL
OCCUPANTS OF YOUR CAR) _____

DID YOU REPORT ACCIDENT TO AUTHORITIES? _____
WHICH POLICE DEPT? _____

Vehicle Accident Report



This is an official document to be initiated by the employee's involved in a vehicle accident. Please answer all questions completely. This report must be forwarded to the Health and Safety Section office within 24 hours of the accident.

| | | | | | |
|-----------------|--|-------------------|------------------------|--------|--|
| Driver Name: | | Driver's License: | | State: | |
| Company Name: | | Address: | | | |
| City: | | State: | | Zip: | |
| Work Phone: | | Home Phone: | | SS#: | |
| Vehicle No.: | | Make/Model: | | Year: | |
| | | | | Plate: | |
| State: | | Leased or Rented: | | Owner: | |
| Vehicle Damage: | | | Estimated Repair Cost: | | |

Additional Involved Vehicles

(use separate form if more than one)

| | | | | | |
|-----------------|--|-------------------|------------------------|--------|--|
| Driver Name: | | Driver's License: | | State: | |
| Company Name: | | Address: | | | |
| City: | | State: | | Zip: | |
| Work Phone: | | Home Phone: | | SS#: | |
| Vehicle No.: | | Make/Model: | | Year: | |
| | | | | Plate: | |
| State: | | Leased or Rented: | | Owner: | |
| Vehicle Damage: | | | Estimated Repair Cost: | | |

Accident Description

(use back of form if necessary)

| | | | | | |
|--------------------------|--|-------|------------|----------|-------|
| Date of incident: | | Time: | | Weather: | |
| Location: | | | | | |
| Description of Accident: | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Witness 1 Name: | | | Phone No.: | | |
| Address: | | | | | |
| Witness 2 Name: | | | Phone No.: | | |
| Address: | | | | | |
| Police Officer's Name: | | | Dept. No.: | | |
| Report Prepared By.: | | | Date: | | |
| Manager Name: | | | Signature | | Date: |

HEALTH AND SAFETY PROCEDURES

SUBJECT:

WELL DRILLING - NONHAZARDOUS SITES

NUMBER: 35

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

EARTH TECH and its contractors will meet applicable health and safety requirements on non-hazardous (Level D) well drilling operations.

2.0 PURPOSE

This procedure describes site safety requirements for well drilling operations on sites not considered hazardous.

3.0 REQUIREMENTS

3.1 Minimum personal protective equipment includes:

- Hard hat;
- Eye protection;
- Steel toe work boots or shoes; and
- Leather gloves (when handling drilling equipment).

3.2 Direct reading air sampling will be conducted and documented utilizing a PID and an LEL meter. Work will be stopped whenever:

- A reading of >10 percent LEL is made at the bore hole; and/or
- A sustained reading of > 10 ppm is made in the workers' breathing zone.

3.3 An EARTH TECH employee will serve as site safety officer and will assure that this and all applicable EARTH TECH health and safety requirements are met. The site safety officer may also function in other capacities (chemist, geologist, sample technician, etc.).

3.4 For Level D sites, these procedures combined with the acknowledgement form from procedure No. 3 and the applicable portions of procedure No. 34 will comprise the site safety plan.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

CONTRACTOR REQUIREMENTS

NUMBER: 36

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 20, 1994

1.0 POLICY

Contractors of EARTH TECH will comply with all applicable health and safety regulations as well as EARTH TECH site safety plans.

2.0 PURPOSE

The purpose of the procedure is to provide EARTH TECH contracting agents with a method to verify contractor compliance with health and safety requirements.

3.0 REQUIREMENTS

- 3.1 Contracting agents shall forward copies of the attached documents to prospective contractors or subcontractors as part of the contractor prequalification process.
- 3.2 EARTH TECH contracting agents shall assure completion of the Contractor Site Safety Rules Checklist and maintain copies with the project file.
- 3.3 Project managers shall maintain copies of forms at project sites for issuance to contractors.
- 3.4 Contractor employees shall attend a site safety plan review prior to the start of each project and sign the acknowledgement.
- 3.5 Contractors who use EARTH TECH-owned personal protective equipment or other supplies will sign the indemnification and release agreement.
- 3.6 Copies of all the forms described here follow this procedure.

1: FORMS SOP CONTREREQU 36

HEALTH AND SAFETY PROCEDURES

SUBJECT:

INSPECTIONS

NUMBER: 37

PAGE: 1 OF: 1

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 20, 1994

1.0 POLICY

Periodic inspections of sites, shops, and other facilities will be used as a means of determining compliance with site safety plans, EARTH TECH safety procedures, and applicable regulations.

2.0 PURPOSE

This procedure describes requirements and checklists for conducting inspections.

3.0 REQUIREMENTS

- 3.1 The Corporate Health and Safety Officer or his/her designee will conduct inspections according to the following schedule:

| | |
|-----------------|------------|
| Job Sites | Weekly |
| Shops | Bi-monthly |
| PCTs | Monthly |
| Labs | Quarterly |

- 3.2 The checklists following this procedure may be used to comply with this procedure.

- 3.3 A written response from the site supervisor or operations manager will be required stating that appropriate corrective actions have been taken or documenting a due date for the corrective actions.

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INDEMNIFICATION AND RELEASE AGREEMENT

FOR AND IN CONSIDERATION OF the use by the undersigned of property, equipment, or supplies belonging to EARTH TECH Remediation Services, formerly Environmental Technology of North America, Inc., and which may include full-face mask respirators, self-contained breathing apparatus, and other equipment and supplies, and other good and valuable consideration, the undersigned, for himself and his successors, and assigns, does hereby release and discharge EARTH TECH, their officers, employees, agents, and subcontractors from any and all claims, actions, demands, damages, costs, loss of services, expenses, compensation, third-party actions, or suits, including attorneys' fees, arising and resulting from the aforementioned use of property, equipment, or supplies belonging to EARTH TECH.

In particular, the undersigned, for himself and his successors, and assigns, agrees to save, hold harmless, protect, indemnify, and defend EARTH TECH, and its officers, employees, agents, and subcontractors against any and all claims, actions and expenses as above described, whether for bodily injury, property damage or destruction, or both, arising or resulting in any way from the use by the undersigned of property of EARTH TECH and agrees to save, hold harmless, protect, indemnify, and defend EARTH TECH against any such claims, actions, or expenses, referenced above, that might be brought against EARTH TECH by any third persons or the heirs, successors, executors or assigns of the undersigned.

The undersigned acknowledges by the signing hereof that he has carefully read this Agreement, understands the contents thereof, and has freely and voluntarily signed the same.

WITNESS my hand this _____ day of _____, 19____.

SIGNED AND ACKNOWLEDGED IN THE PRESENCE OF:

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CONTRACTOR SITE SAFETY RULES CHECKLIST

The following checklist shall be reviewed and signed by the prime contractor, and his subcontractors, and project manager or job site supervisor or designees, prior to the scheduled start of a job. While the job is in progress, where applicable, hazardous operations permits shall be obtained on a daily basis, or more frequently as appropriate, to assure safety.

GENERAL

- ☐ 1 All vehicles shall observe a maximum speed limit of 10 MPH, unless otherwise posted. There will be no passing of moving vehicles at job sites when narrow roads and short-sight distances exist.
- ☐ 2 Hard hat and approved eye protection are required at all times except in designated areas.
- ☐ 3 Smoking or eating is permitted only in designated areas.
- ☐ 4 Contractor is expected to maintain good housekeeping during the duration of work. Daily trash pick up is required. At the end of the job the Contractor shall leave the job site in at least as good an appearance and condition as it was found.
- ☐ 5 Contractor is to provide first-aid kit. Contractor hereby prescribes emergency hospital as indicated below:

Hospital: _____ Phone: _____

Address: _____

- ☐ 6 Review with site supervisor the emergency evacuation route and telephone location. In case of emergency, notify site supervisor immediately and call the appropriate service.

Fire Department: _____

Ambulance: _____

Sheriff: _____

- ☐ 7 EARTH TECH work rules also prohibit:

- Possession or consumption of intoxicants or illegal drugs or narcotics
- Violation of Federal and State safety regulation
- Gambling
- Possession of firearms
- Fighting, horseplay, or practical joking
- Sabotage or pilfering

- Running, except in an emergency

- ☐ 8 All accidents (personal injury or property damage) shall be reported to the site supervisor as soon as emergency conditions no longer exist. The person involved shall make a written accident report prior to leaving the site, unless prevented by emergency conditions, i.e., injury.
- ☐ 9 There shall be no personnel on the work site except for authorized contractor/subcontractor employees without EARTH TECH management approval.
- ☐ 10 EARTH TECH representative has discussed with the contractor and his subcontractors the nature of the potential hazards that may be encountered.

HAZARDOUS ATMOSPHERES AND HAZARDOUS ENVIRONMENTS

- ☐ 11 Contractor shall provide his own calibrated combustible gas/oxygen analyzer or other instruments for checking areas before confined space, hot work, or other work in hazardous atmospheres or environments. Contractor is responsible for all testing and monitoring required by applicable regulations. No testing by EARTH TECH shall be in lieu of above requirements.
- ☐ 12 Contractor shall provide a standby during confined space work and a fire watch during hot work.
- ☐ 13 Hot work, confined space entry, line opening procedures, scaffolding, use of heavy equipment, excavations and trenching, and other planned hazardous atmospheres and hazardous environment activities shall be reviewed with site supervisor before commencing work.
- ☐ 14 Contractor personnel shall know the location of the nearest fire extinguisher, fire water line, safety shower, and eye bath.
- ☐ 15 Any change of conditions around hot work, confined space, or other hazardous atmosphere or hazardous environment areas which could affect previous test readings or safety conditions shall invalidate all permits and approvals. Retesting or reevaluation of the area, by a designated person, is required before work can be resumed.

Contractors are expected to brief their employees and enforce these rules. EARTH TECH management may stop or suspend work, at no cost to EARTH TECH, any time the Contractor fails to comply with applicable OSHA regulations and EARTH TECH health and safety procedures.

Contractor Signature

Date

Representative Signature

Date

Name Printed

Name Printed

SHOP INSPECT : CHECKLIST

Page 1 of 2

Shop Location _____ Date ____/____/____

| | Yes | No | | Yes | No |
|---|-------|-------|--|-------|-------|
| Medical and First Aid | | | 3. Are guards and safety devices in place on power tools? | _____ | _____ |
| 1. Are first aid kits accessible and identified? | _____ | _____ | 4. Are power tools inspected before each use? | _____ | _____ |
| 2. Are emergency eye wash and safety showers available? | _____ | _____ | Motor Vehicles | | |
| 3. Are daily logs of first aid present and up to date? | _____ | _____ | 1. Are vehicles inspected before each use? | _____ | _____ |
| 4. Are first aid kits inspected weekly? | _____ | _____ | 2. Are personnel licensed for the equipment they operate? | _____ | _____ |
| Personal Protective Equipment | | | 3. Are unsafe vehicles tagged and reported to supervision? | _____ | _____ |
| 1. Have employees been fit-tested? | _____ | _____ | 4. Are vehicles shut down before fueling? | _____ | _____ |
| 2. Is defective personal protective equipment tagged? | _____ | _____ | 5. When backing vehicles, are spotters provided? | _____ | _____ |
| 3. Does compressed breathing air meet CGA Grade "D" minimum? | _____ | _____ | 6. Is safety equipment on vehicles? | _____ | _____ |
| 4. Are there sufficient quantities of safety equipment and repair parts? | _____ | _____ | 7. Are loads secure on vehicles? | _____ | _____ |
| Fire Prevention | | | Hazardous Waste Compliance | | |
| 1. Is smoking prohibited in flammable storage areas? | _____ | _____ | 1. Are hazardous wastes stored in DOT approved containers? | _____ | _____ |
| 2. Are fire lanes established and maintained? | _____ | _____ | 2. Are hazardous waste containers labeled and dated? | _____ | _____ |
| 3. Are flammable dispensing systems grounded and bonded? | _____ | _____ | 3. Is a contingency plan on file? | _____ | _____ |
| 4. Are proper receptacles available for storage of flammables? | _____ | _____ | 4. Is there a preparedness and prevention plan in effect? | _____ | _____ |
| Welding and Cutting | | | 5. Are waste container dates outdated? | _____ | _____ |
| 1. Are fire extinguishers present at welding and cutting operations? | _____ | _____ | 6. Are warning signs posted? | _____ | _____ |
| 2. Are confined spaces, such as tanks, pipelines, and trenches, tested prior to cutting and welding operations? | _____ | _____ | 7. Is hazardous waste stored in a secure area? | _____ | _____ |
| 3. Are hot work permits available? | _____ | _____ | OSHA Posters | | |
| 4. Are proper helmets, aprons and gloves available for welding and cutting operations? | _____ | _____ | Are the following documents posted in a prominent and accessible area? | | |
| 5. Are welding equipment and other machines properly grounded? | _____ | _____ | 1. Minimum Wage | _____ | _____ |
| 6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart? | _____ | _____ | 2. OSHA Health and Safety | _____ | _____ |
| 7. Are only trained personnel permitted to operate welding and cutting equipment? | _____ | _____ | 3. Equal Employment Opportunity | _____ | _____ |
| 8. Are welding operations properly shielded? | _____ | _____ | Scaffolding and Ladders | | |
| Hand and Power Tools | | | 1. Are scaffolding and ladders placed on a flat, firm surface? | _____ | _____ |
| 1. Are defective hand and power tools tagged and taken out of service? | _____ | _____ | 2. Are scaffold planks free of mud, ice, grease, etc.? | _____ | _____ |
| 2. Is eye protection available and used when operating power tools? | _____ | _____ | 3. Is scaffolding inspected before each use? | _____ | _____ |
| | | | 4. Are defective scaffolding parts taken out of service? | _____ | _____ |
| | | | 5. Does scaffold height exceed four times the width or base dimension? | _____ | _____ |
| | | | 6. Does scaffold planking overlap a minimum of 12 inches? | _____ | _____ |
| | | | 7. Does scaffold planking extend over end support between 6-18 inches? | _____ | _____ |
| | | | 8. Are employees restricted from working on scaffold during storms or | _____ | _____ |

SHOP INSPECTION CHECKLIST

Page 2 of 2

Shop Location _____ Date ____/____/____

Yes No

Yes No

high winds?

9. Are all pins in place and wheels locked?

10. Are both hands free when ascending or descending ladders?

11. Are defective ladders taken out of service?

Breathing Apparatus

1. Is breathing apparatus being inspected on a monthly basis?

2. Are out of service breathing air units clearly marked?

3. Are only certified persons permitted to perform repairs to breathing apparatus?

4. Are breathing air cylinders charged to prescribed pressures?

5. Have breathing air cylinders been hydrostatically tested within the past 4 years?

Materials Handling

1. Are materials stacked and stored to prevent sliding or collapsing?

2. Are flammables and combustibles stored in non-smoking areas?

3. Is machinery braced when personnel are performing maintenance?

4. Are tripping hazards labeled?

5. Are semi-trailers chocked?

6. Are fixed jacks used under semi-trailers?

7. Are riders prohibited on materials handling equipment?

8. Are cranes inspected and logged as prescribed?

9. Are OSHA-approved manlifts provided for the lifting of personnel?

10. Are all containers labeled as to contents?

11. Are flammable liquids stored in approved safety cans?

Fire Protection

1. Has a fire alarm been established?

2. Do employees know the location and use of all fire extinguishers?

3. Are fire extinguishers marked and inspected?

4. Are combustible materials segregated from open flames?

Electrical

1. Are warning signs exhibited on high voltage equipment (250 V. or greater)?

2. Is electrical equipment and wiring properly guarded?

3. Are electrical lines, extension cords, and cables guarded and maintained in good condition?

4. Are extension cords kept out of wet areas?

5. Is damaged electrical equipment tagged and taken out of service?

Compressed Gas Cylinders

1. Are breathing air cylinders charged only to prescribed pressures?

2. Are like cylinders segregated in well ventilated areas?

3. Is smoking prohibited in cylinder storage areas?

4. Are cylinders stored secure and upright?

5. Are cylinders protected from snow, rain, etc.?

6. Are cylinder caps in place before cylinders are moved?

7. Are fuel gas and O₂ cylinders stored a minimum of 20 feet apart?

Confined Spaces

1. Have employees been trained in the hazards of confined spaces?

2. Are confined space permits available at the shop?

3. Is a confined space company safety procedure available?

I have reviewed this inspection checklist with the safety inspector and fully understand the recommendations and will make every attempt to comply with them immediately.

Shop Supervisor _____

Safety Inspector _____

SHOP INSPECTION CHECKLIST

Page 1 of 2

Shop Location _____ Date ____/____/____

Yes No

Yes No

Medical And First Aid

1. Are first aid kits accessible and identified? _____
2. Are emergency eye wash and safety showers available? _____
3. Are daily logs for first aid present and up to date? _____
4. Are first aid kits inspected weekly? _____

Personal Protective Equipment

1. Have levels of personal protection been established? _____
2. Do all employees know their level of protection? _____
3. Are respirators used, decontaminated, inspected, and stored according to standard procedures? _____
4. Have employees been fit-tested? _____
5. Is defective personal protective equipment tagged? _____
6. Does compressed breathing air meet CGA grade "D" minimum? _____
7. Are there sufficient quantities of safety equipment and repair parts? _____

Fire Prevention

1. Is smoking prohibited in flammable storage areas? _____
2. Are fire lanes established and maintained? _____
3. Are flammable dispensing systems grounded and bonded? _____
4. Are proper receptacles available for storage of flammables? _____
5. Has the local fire department been contacted? _____

Welding And Cutting

1. Are fire extinguishers present at welding and cutting operations? _____
2. Are confined spaces, such as, tanks, pipelines, and trenches, tested prior to cutting and welding operations? _____
3. Are hot work permits available? _____
4. Are proper helmets, aprons and gloves available for welding and cutting operations? _____
5. Are welding and machines properly grounded? _____

6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart? _____
7. Are only trained personnel permitted to operate welding and cutting equipment? _____

Hand And Power Tools

1. Are defective hand and power tools tagged and taken out of service? _____
2. Is eye protection available and used when operating power tools? _____
3. Are guards and safety devices in place on power tools? _____
4. Are power tools inspected before each use? _____
5. Are non-sparking tools available? _____

Motor Vehicles

1. Are vehicles inspected before each use? _____
2. Are personnel licensed for the equipment they operate? _____
3. Are unsafe vehicles tagged and reported to supervision? _____
4. Are vehicles shut down before fueling? _____
5. When backing vehicles, are spotters provided? _____
6. Is safety equipment on vehicles? _____
7. Are loads secure on vehicles? _____

Emergency Plans

1. Are emergency telephone numbers posted? _____
2. Have emergency escape routes been designated? _____
3. Are employees familiar with the emergency signal? _____

Materials Handling

1. Are materials stacked and stored as to prevent sliding or collapsing? _____
2. Are flammables and combustibles stored in non-smoking areas? _____
3. Is machinery braced when personnel are performing maintenance? _____
4. Are tripping hazards labeled? _____
5. Are semitrailers chocked? _____
6. Are fixed jacks used under semitrailers? _____
7. Are riders prohibited on materials handling equipment? _____
8. Are cranes inspected as prescribed and logged? _____
9. Are OSHA-approved manlifts provided for the lifting of personnel? _____

SAFETY INSPECTION CHECKLIST FOR LABORATORY

Page 2 of 2

| | Yes | Needs Attention | | Yes | Needs Attention |
|--|-------|--------------------|--|-----|--------------------|
| or one anchored securely. | _____ | _____ | | | |
| 6. There is sufficient storage space. | _____ | _____ | | | |
| 7. All containers are correctly labeled. | _____ | _____ | | | |
| 8. Flammable liquid storage cabinets are provided where more than 10 gallons are stored. | _____ | _____ | | | |
| 9. Chemical storage areas are adequately ventilated. | _____ | _____ | | | |
| 10. Flammable liquid storage areas are labeled "Flammable, Keep Fire Away" or "No Smoking." | _____ | _____ | | | |
| 11. Flammable liquid storage areas are free of ignition sources. | _____ | _____ | | | |
| F. Electrical Safety | | | | | |
| 1. All electrical outlets are correctly grounded. | _____ | _____ | | | |
| 2. All electrical equipment is correctly grounded or double insulated. | _____ | _____ | | | |
| 3. An over temperature shut-off switch is provided for unattended heating equipment. | _____ | _____ | | | |
| 4. All refrigeration equipment is labeled to indicate suitability or unsuitability for the storage of flammable liquids. | _____ | _____ | | | |
| 5. All electrical cords are in a safe condition and of sufficient capacity. | _____ | _____ | | | |
| 6. There are no multiple plug-ins to individual electrical sockets. | _____ | _____ | | | |

Project Name _____ Project Location _____

Site Supervisor _____ Inspector's Name _____ Date ____/____/____

Yes No

Yes No

A. Safety Practices

1. A written emergency plan is readily available to all personnel. _____
2. Mouth pipetting is prohibited. _____
3. There is a current written record of the hazardous materials being stored or used in the laboratory. _____
4. Doors are kept closed. _____
5. Hazardous processes are done in a hood. _____
6. Eating, chewing, drinking and smoking are prohibited. _____
7. Appropriate disinfection is used. _____
8. Safety showers are certified annually and eye wash stations are tested weekly. _____
9. A formal safety orientation is provided at least annually for all people at risk. _____
10. Hands are washed frequently, especially before leaving the laboratory. _____
11. Liquid spills are cleaned up immediately to avoid slips and falls. _____

B. Physical Safety

1. There is a safe egress from each end of laboratory. _____
2. There are no tripping hazards. _____
3. The floors, walls, and ceiling are in good repair. _____
4. The aisles are unobstructed. _____
5. All equipment is appropriately maintained in good repair. _____
6. Building air movement is in the direction from areas of lesser to areas of greater hazard. _____
7. All hoods are certified annually. _____
8. Exits are clear with stairways and handrails. _____

C. General Sanitation

1. Waste containers are easily cleanable. _____
2. Hazardous waste containers are clearly marked. _____

3. Appropriate methods of hazardous waste disposal are used. _____
4. There are convenient hand washing facilities. _____
5. All areas are clean and uncluttered. _____
6. The lighting is appropriate. _____
7. There is a separately, clearly marked container for broken glass, needles, and other sharp waste material. _____

D. Safety Equipment

1. An eye wash and safety shower are provided. _____
2. Two 20-pound fire extinguishers are available and checked. _____
3. Absorbent material is available in case of a spill involving hazardous liquids. _____
4. Appropriate personal protection (lab coat, face shield, gloves, splash goggles, etc.) is available and used. _____
5. An appropriate first aid kit is available and is regularly inspected and resupplied. _____
6. Appropriate signs are posted. _____
7. Non-breakable containers are used for transporting primary containers. _____
8. All belts, pulleys, and other exposed moving equipment parts are guarded. _____

E. Chemicals, Storage and Labeling

1. All compressed gas cylinders are labeled, secured, capped (if not in use), and away from heat sources. _____
2. Incompatible chemicals are segregated. _____
3. Heavy objects are stored at a level of 5 feet above the floor or lower. _____
4. Peroxide-forming chemicals are dated when purchased and when first opened. Outdated chemicals are safely disposed of. _____
5. All shelving and cabinets are used in a manner to prevent tipping. _____

SAFETY INSPECTION PROJECT SITES

Page 2 of 3

Project Name _____ Project Location _____

Site Supervisor _____ Inspector's Name _____ Date ____/____/____

| | Yes | No | | Yes | No |
|--|-------|-------|--|-------|-------|
| 10. Are all containers labeled as to contents? | _____ | _____ | 5. Are cylinders protected from snow, rain, etc.? | _____ | _____ |
| 11. Are flammable liquids stored in approved safety cans? | _____ | _____ | 6. Are cylinder caps in place before cylinders are moved? | _____ | _____ |
| Fire Protection | | | 7. Are fuel gas and O ₂ cylinders stored a minimum of 20 feet apart? | _____ | _____ |
| 1. Has a fire alarm been established? | _____ | _____ | Scaffolding | | |
| 2. Do employees know the location and use of all fire extinguishers? | _____ | _____ | 1. Is scaffolding placed on a flat, firm surface? | _____ | _____ |
| 3. Are fire extinguishers marked and inspected weekly? | _____ | _____ | 2. Are scaffold planks free of mud, ice, grease, etc.? | _____ | _____ |
| 4. Are combustible materials segregated from open flames? | _____ | _____ | 3. Is scaffolding inspected before each use? | _____ | _____ |
| Electrical | | | 4. Are defective scaffold parts taken out of service? | _____ | _____ |
| 1. Are warning signs exhibited on high voltage equipment (250 V. or greater)? | _____ | _____ | 5. Does scaffold height exceed 4 times the width or base dimension? | _____ | _____ |
| 2. Is electrical equipment and wiring properly guarded? | _____ | _____ | 6. Does scaffold planking overlap a minimum of 12 inches? | _____ | _____ |
| 3. Are electrical lines, extension cords, and cables guarded and maintained in good condition? | _____ | _____ | 7. Does scaffold planking extend over end supports between 6" to 18"? | _____ | _____ |
| 4. Are extension cords kept out of wet areas? | _____ | _____ | 8. Is general housekeeping up to EARTH TECH standards? | _____ | _____ |
| 5. Is damaged electrical equipment tagged and taken out of service? | _____ | _____ | Walking And Working Surfaces | | |
| 6. Have underground electrical lines been identified by proper authorities? | _____ | _____ | 1. Are accessways, stairways, ramps, and ladders clean of ice, mud snow or debris? | _____ | _____ |
| 7. Has a positive lock-out system been established by the project electrician? | _____ | _____ | 2. Do ladders exceed maximum lengths? | _____ | _____ |
| Slings And Chains | | | 3. Are ladders used in passageways, doors, or driveways? | _____ | _____ |
| 1. Are damaged slings, chains, and rigging tagged and taken out of service? | _____ | _____ | 4. Are broken or damaged ladders tagged and taken out of service? | _____ | _____ |
| 2. Are slings inspected before each use? | _____ | _____ | 5. Are metal ladders prohibited in electrical service? | _____ | _____ |
| 3. Are slings padded or protected from sharp corners? | _____ | _____ | 6. Are stairways and floor openings guarded? | _____ | _____ |
| 4. Do employees keep clear of suspended loads? | _____ | _____ | 7. Are safety feet installed on straight and extension ladders? | _____ | _____ |
| Compressed Gas Cylinders | | | 8. Is general housekeeping up to EARTH TECH standards? | _____ | _____ |
| 1. Are breathing air cylinders charged only to prescribed pressures? | _____ | _____ | Site Safety Plan | | |
| 2. Are like cylinders segregated in well ventilated areas? | _____ | _____ | 1. Is a site safety plan posted on site or accessible to all employees? | _____ | _____ |
| 3. Is smoking prohibited in cylinder storage areas? | _____ | _____ | 2. Have potential hazards been described to employees on site? | _____ | _____ |
| 4. Are cylinders stored secure and upright? | _____ | _____ | 3. Are manufacturer safety data sheets available for review by employees on site? | _____ | _____ |
| | | | 4. Is there a designated safety official on site? | _____ | _____ |
| | | | 5. Are employees aware and knowledgeable of the results of exposure? | _____ | _____ |

Project Name _____ Project Location _____

Site Supervisor _____ Inspector's Name _____ Date ____/____/____

Yes No

Yes No

Site Posters

Are the following documents posted in a prominent and accessible area?

1. Minimum Wage
2. OSHA Health and Safety
3. Equal Employment Opportunity

Site Set Up

1. Are work zones clearly defined?
2. Are support trailers located to minimize exposure from a potential release?
3. Are support trailers accessible for approach by emergency vehicles?
4. Is the site properly secured during and after work hours?

Heavy Equipment

1. Is heavy equipment inspected as prescribed by the manufacturer?
2. Is defective heavy equipment tagged and taken out of service?
3. Are project roads and structures inspected for load capacities and proper clearances?
4. Is heavy equipment shut down for fueling and maintenance?
5. Are back-up alarms installed and working on equipment?
6. Are only designated operators operating equipment?
7. Are riders prohibited on heavy equipment?
8. Are guards and safety appliances in place and used?
9. Are OSHA-approved manlifts provided for the lifting of personnel?

Excavation

1. Are the sides of excavations sloped or shored to prevent caving in on employees?
2. Are guardrails or fences placed around excavations, near pedestrian or vehicle thoroughfares?
3. Prior to opening excavations, are utilities located and marked?

4. Are ladders used in trenches over 4 feet deep?

5. Is material excavated placed a minimum of 24 inches from the trench?

Confined Spaces

1. Have employees been trained in the hazards of confined spaces?
2. Are confined space permits available on project site?
3. Is a confined space company safety procedure on the project site?

Personnel Decontamination

1. Are decontamination stations set up on site?
2. Is a contamination reduction zone set up on site?
3. Are waste receptacles available for contaminated clothing?
4. Are steps taken to contain liquids used for decontamination?
5. Have decontamination steps and procedures been covered by the site supervisor or safety official?
6. Is all personal protective equipment and respiratory equipment being cleaned on a daily basis?

I have reviewed this inspection checklist with the safety inspector and fully understand the recommendations and will make every attempt to comply with them immediately.

Site Supervisor _____

Safety Inspector _____

HEALTH AND SAFETY PROCEDURES

SUBJECT:

SUBSURFACE DRILLING

NUMBER: 38

PAGE: 1 OF: 3

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

1.0 POLICY

EARTH TECH will identify and categorize potential health and safety hazards for each work site and follow a work-procedures program to ensure the health and safety of employees who are required to participate in or work around drilling equipment.

2.0 PURPOSE

This document will review the types of drill rigs, associated hazards, and safety procedures for drilling activities.

3.0 REQUIREMENTS

A. Rotary Drills

1. Use a drilling fluid to remove cuttings from the borehole as the drill advances. Stabilize the borehole and keep it open. Cool and lubricate the drill bit, and control buildup fluids and cuttings.
2. The fluid can be air, mud, polymer, water, or a combination of these elements. Ensure that site-specific fluid is used.

B. Hollow-Stem Auger

1. The dry drill technique can be used only in unconsolidated sediments.
2. Depth limits are 50 to 150 feet.

C. Cable Tool Rigs

1. This technique involves driving the casing with an overhead weight.
2. A small amount of water is added to the borehole, and the cuttings are bailed from inside the casing.
3. This technique is used in glacial till soils.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------------|--------------------------------|---------------|
| SUBJECT: SUBSURFACE DRILLING | NUMBER: 38 | PAGE: 2 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

4.0 HAZARDS

A. Drill Rig Hazards

1. Air rotary drilling: compressor hose can break loose, fly around uncontrollably, damage equipment, and seriously injure or kill personnel.
2. Stacked pipes could collapse.
3. Heavy equipment (i.e., drill rig, compressor, water truck, flat-bed truck) can pose a variety of hazards.
4. Rope used to hoist a cathead during sampling can slip or break.
5. The weight used to drive the split-spoon is located overhead and metal can be released if the split-spoon disintegrates.
6. Cuttings, drilling liquids, and ground water may be contaminated.
7. The borehole provides a conduit for hazardous fluid vapors to reach the surface.
8. Rotary drilling with air can cause air stripping of hazardous volatiles that may be present in the soil; these vapors can become concentrated at the wellhead.
9. Slips, trips, and falls.
10. Becoming entwined in rotating tools.
11. Drilling into underground cables or becoming entwined in electrical power lines.
12. Exposure to hot engine parts.

B. Major Accidents

1. Blowouts: uncontrolled escape of gas, oil, or water that may lead to fire, explosion, drilling rig destruction, injury, or death.
2. Hydrogen sulfide is most likely encountered in deep wells drilled next to oil or gas fields. This gas is dangerous because of its hard-to-detect odor as a warning and the sudden onset of incapacitation.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------------|--------------------------------|---------------|
| SUBJECT: SUBSURFACE DRILLING | NUMBER: 38 | PAGE: 3 OF: 3 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

5.0 SAFETY PROCEDURES

- A. Use common sense.
- B. Know the location of underground and overhead utilities.
- C. Use required personal protective equipment; do not wear loose-fitting clothing or jewelry.
- D. Do not touch or go near moving parts.
- E. Know the location of "Emergency Shut Off" switches.
- F. Stay away from operating equipment, especially if rig is located on unstable terrain.
- G. In the event of an accident, allow properly equipped and protected personnel to respond. Immediately leave the area.
- H. Do not smoke or use spark-producing equipment around drilling operations.
- I. Do not work around a drill rig during a thunderstorm or rain.

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HEALTH AND SAFETY PROCEDURES

| | | |
|---|--------------------------------|---------------|
| SUBJECT: EXCAVATION OF UNKNOWN DRUMS | NUMBER: 39 | PAGE: 1 OF: 6 |
| | DATE PUBLISHED: April 23, 1991 | |
| | DATE REVISED: May 17, 1994 | |

1.0 POLICY

The excavation of drums is a two-part procedure: excavation which will be performed in accordance with 29 CFR 1926 Subpart P and drum handling. Because excavation and drum handling introduces the potential for danger, every step of the operation will be carefully planned, based on all available information.

2.0 PURPOSE

This procedure provides technical guidance on the safe excavation and handling of drums and other containers.

3.0 REQUIREMENTS

A. Planning

Because drum handling introduces the potential for danger, every step of the operation should be carefully planned, based on all available information. The results of the preliminary inspection can be used to determine (1) if any hazards are present and the appropriate response, and (2) which drums need to be moved in order to be opened and sampled. A preliminary plan should be developed that specifies the procedures based on the hazards associated with the probable drum contents as determined by visual inspection. This plan should be revised as new information is obtained during drum handling.

B. Handling

The purpose of handling is to (1) respond to any obvious problems that might impair worker safety, such as radioactivity, leakage, or the presence of explosive substances, (2) unstack and orient drums for sampling, and (3) if necessary, to organize drums into different areas on site to facilitate characterization and remedial action. Handling may or may not be necessary, depending on how the drums are positioned at a site.

Since accidents occur frequently during handling, particularly initial handling, drums should be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling by using remote methods. In all phases of handling, personnel should be alert for new information about potential hazards. Personnel should respond to new hazard information before continuing with routine handling operations. Overpack drums (larger drums in which leaking or damaged drums are placed for storage or shipment (see 49 CFR Part 173.3(c)) and an adequate volume of adsorbent should be kept near areas where minor spills may occur. Where major spills may occur, a containment berm adequate to contain the entire volume of liquid in the drums should be constructed prior to any drum handling. If drum contents spill, personnel trained in spill-response procedures should isolate and contain the spill.

Several types of equipment can be used to move drums: (1) A drum grappler attached to a hydraulic excavator; (2) a small front-end loader, which can be either loaded manually or equipped with a bucket sling; (3) a rough-terrain forklift; (4) a roller conveyor equipped with solid rollers; and (5) drum carts

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EXCAVATION OF UNKNOWN DRUMS

NUMBER: 39

PAGE: 2 OF 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

designed specifically for drum handling. Sometimes drums are moved manually. The drum grappler is the preferred piece of equipment for drum handling. The grappler distances the operator from the drums so there is less likelihood of injury if the drums detonate or rupture. If the drum is leaking, the operator can stop the leak by rotating the drum and immediately placing it into an overpack. In case of an explosion, grappler claws help protect the operator by partially deflecting the force of the explosion.

The following procedures can be used to maximize worker safety during drum handling and movement:

- Train personnel in proper lifting and moving techniques to prevent back injuries.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads and can operate smoothly on the available road surface.
- Air condition vehicle cabs to increase operator efficiency; protect the operator with heavy splash and/or blast shields.
- Supply operators with appropriate respiratory protective equipment when needed. Normally, either a combination SCBA/SAR with the air tank fastened to the vehicle or an airline respirator and an escape SCBA are used because of the high hazard potential of drum handling. Respiratory equipment improves operator efficiency and provides protection in case the operator must abandon the equipment.
- Have overpacks ready before attempting to move drums.
- Before moving containers, determine the most appropriate sequence for moving the various drums and other containers. For example, small containers may have to be removed first to permit heavy equipment to enter and move larger drums.
- Exercise extreme caution in handling drums that are not intact and tightly sealed.
- Ensure that operators have a clear view of the roadway when carrying drums. If necessary, station ground workers to guide the operator's motion.

Drums Containing Radioactive Waste

- If the drum exhibits radiation levels above background, immediately contact a health physicist. Do not handle any drums that are determined to be radioactive before consulting individuals with expertise in this area.

Drums that May Contain Explosive or Shock-Sensitive Waste

- If a drum is suspected to contain explosive or shock-sensitive waste as determined by visual inspection, seek specialized assistance before handling.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EXCAVATION OF UNKNOWN DRUMS

NUMBER: 39

PAGE: 3 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- If handling is necessary, handle these drums with *extreme caution*.
- Prior to handling these drums, move all nonessential personnel a safe distance away.
- Use a grappler unit constructed for explosive containment for initial handling of such drums.
- Place drums on pallets prior to transport. Secure drums to pallets.
- Use an audible siren signal system, similar to the type used in conventional blasting operations, to signal the commencement and completion of explosive waste handling activities.
- Maintain continuous communications with the Site Safety Officer and/or the command post until drum handling operations are complete.

Bulging Drums

- Pressurized drums are extremely hazardous. Wherever possible, do not move drums that are internally pressurized, as evidenced by bulging or swelling.
- If a pressurized drum must be moved, whenever possible handle the drum with a grappler unit constructed for explosive containment. Either move the bulged drum only as far as necessary to allow seating on firm ground or carefully overpack the drum. Exercise extreme caution when working with or adjacent to potentially pressurized drums.

Leaking, Open, and Deteriorated Drums

- If a drum containing a liquid cannot be moved without rupture, immediately transfer its contents to a sound drum using a pump designed for liquid transfer.
- Using a drum grappler, immediately place the following damaged drums in overpack containers:

Leaking drums that contain sludges or semi-solids.

Open drums that contain liquid or solid waste.

Deteriorated drums that can be moved without rupture.

Buried Drums

- Prior to initiating subsurface excavation, use ground-penetrating systems to estimate the location and depth of the drums.
- Remove soil with great caution to minimize the potential for drum rupture.
- Keep a dry chemical fire extinguisher on hand to control small fires.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EXCAVATION OF UNKNOWN DRUMS

NUMBER: 39

PAGE: 4 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

Opening

Drums are usually opened and sampled in place during site investigations. However, remedial and emergency operations may require a separate drum-opening area. Procedures for opening drums are the same regardless of location. To enhance the efficiency and safety of drum-opening personnel, the following procedures should be instituted.

- If a supplied-air respiratory protection system is used, place a bank of air cylinders outside the work area and supply air to the operators via airlines and escape SCBAs. This practice enables workers to operate in relative comfort for extended periods of time.
- Protect personnel by keeping them at a safe distance from the drums being opened. If personnel must be located near the drums, place explosion-resistant plastic shields between them and the drums as protection in case of detonation. Locate controls for drum-opening equipment, monitoring equipment, and fire-suppression equipment behind the explosion-resistant plastic shield.
- If possible, monitor drums continuously during opening. Place monitoring equipment sensors, such as colormetric tubes, dosimeters, radiation survey instruments, explosion meters, organic vapor analyzers, and oxygen meters as close as possible to the source of contaminants, i.e., at the drum opening.
- Use the following remote-controlled devices for opening drums:

Pneumatically operated impact wrench to remove drums bungs.

Hydraulically or pneumatically operated drum piercers.

Backhoes equipped with bronze spikes for penetrating drum tops in large-scale operations.

- Do *not* use picks, chisels or firearms to open drums.
- Hang or balance the drum-opening equipment to minimize worker exertion.
- If the drum shows signs of swelling or bulging, perform all steps slowly. Relieve excess pressure prior to opening and, if possible, from a remote location using devices such as a pneumatic impact wrench or hydraulic penetration device. If pressure must be relieved manually, place a barrier, such as explosion-resistant plastic sheeting, between the worker and bung to deflect any gas, liquid, or solids that may be expelled as the bung is loosened.
- Open exotic metal drums and polyethylene or polyvinyl chloride-lined (PVC-lined) drums through the bung by removal or drilling. Exercise extreme caution when manipulating these containers.
- Do *not* open or sample individual containers within laboratory packs.
- Reseal open bungs and drill openings as soon as possible with new bungs or plugs to avoid explosions and/or vapor generation. If an open drum cannot be resealed, place the drum into an overpack. Plug

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EXCAVATION OF UNKNOWN DRUMS

NUMBER: 39

PAGE: 5 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

any openings in pressurized drums with pressure-venting caps set to a 5-psi (pounds per square inch) release to allow venting of vapor pressure.

- Decontaminate equipment after each use to avoid mixing incompatible wastes.

Drum Segregation and Staging

Before moving drums or containers, employees with the transfer operation should be warned of the potential hazards associated with the contents of the drums or containers and should review the latest site information and risk analysis forms. In congested areas where drums are staged, EARTH TECH personnel will use forklifts to move drums to minimize abrasions, pinch hazards, etc.

Prior to handling or moving any containers, the foreman will inspect the condition and integrity of all containers and recommend to the Project Manager the necessary procedures to be followed. Drums will be marked to indicate acceptability for handling. Specific locations for drum staging will be constructed during site mobilization. These areas will be equipped with all proper safety and emergency equipment necessary to contain spills and releases. Exact staging locations will be noted on the site plan and incorporated into this HASP using the task risk (job safety) analysis form.

The United States Department of Transportation (USDOT)-specified salvage drums or containers and sizable quantities of proper absorbent and neutralizers (diatomaceous earth, citric acid powder, soda ash, activated carbon, sorbent pads, and boom) will be available and used in areas where spills, leaks, or ruptures may occur.

For major spills or leaks, a customized spill pallet with all necessary tools and equipment will be moved into position. The pallet will contain sorbent media, neutralizing media, tools and equipment, and fire extinguishers. The pallet will be accessible and fully stocked at all times to respond to spills, leaks, or releases during the project.

Drums and containers that cannot be moved without rupture, leakage, or spillage will be emptied into a sound container using a device classified for the material being transferred. Typically, this would be done with an explosion-proof transfer pump or a peristaltic pump. Soil or covering material will be removed with caution to prevent drum or container rupture. Fire extinguishers will be available to control small fires. Personnel will don level B PPE to include Saran[®] suits and chemical-resistant gloves/booties.

Chemical spills, splashes, and reactions between incompatible chemicals present the greatest risks for exposure in these operations. The principal routes of exposure are skin contact and inhalation. An emergency eyewash station will be present in the work area.

To minimize hazards, the following standard operating procedures will be followed when handling drums and containers:

- Drums and containers used during the cleanup will meet the appropriate DOT, OSHA, and USEPA regulations for their respective wastes. When in doubt about the proper container, ask the foreman.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

EXCAVATION OF UNKNOWN DRUMS

NUMBER: 39

PAGE: 6 OF: 6

DATE PUBLISHED: April 23, 1991

DATE REVISED: May 17, 1994

- Drums and containers will be inspected and their integrity ensured prior to being moved. Drums or containers that cannot be inspected before being moved because of inaccessible storage conditions will be moved to an open location and inspected before further handling.
- Unlabeled drums and containers will be considered to contain hazardous substances and will be handled accordingly until the contents are positively identified and noted on the label.

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

DRUM SAMPLING

NUMBER: 40

PAGE: 1 OF: 9

DATE PUBLISHED: February 8, 1995

DATE REVISED:

1.0 POLICY

Drums and other containers will be sampled to characterize their contents.

2.0 PURPOSE

This procedure provides technical guidance on implementing safe and cost-effective response actions applicable to hazardous waste sites containing drums. Container contents are sampled and characterized for disposal, bulking, recycling, grouping, and/or classification purposes.

3.0 REQUIREMENTS

Prior to sampling, drums must be inventoried, staged, and opened. Inventory entails recording visual qualities of each drum and any characteristic pertinent to the contents' classification. Staging involves the organization, and sometimes consolidation of drums that have similar wastes or characteristics. Closed drums can be opened manually or remotely. Remote drum opening is recommended for worker safety. The most common method of sampling a drum involves the use of a glass thief. This method is quick, simple, relatively inexpensive, and requires no decontamination.

4.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

- No preservatives shall be added to the sample.
- Place sample container in two Ziplock[®] plastic bags.
- Place each bagged container in a one-gallon, covered can containing absorbent packaging material. Place lid on can.
- Mark the sample identification number on the outside of the can.
- Place marked cans in a cooler, and fill remaining space with absorbent packing material.
- Fill out chain of custody record for each cooler, place in plastic, and affix to the inside of the cooler lid.
- Secure and custody seal the cooler lid.
- Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved.

5.0 INTERFERENCES AND POTENTIAL PROBLEMS

The practice of tapping drums to determine their contents is neither safe nor effective and should not be used if the drums are visually over pressurized or if shock-sensitive materials are suspected.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|----------------------------------|---------------|
| SUBJECT: DRUM SAMPLING | NUMBER: 40 | PAGE: 2 OF: 9 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

Do not move drums that have been overpressurized to the extent that the head is swollen several inches above the level of the chime. A number of devices have been developed for venting critically swollen drums. One proven method is a tube and spear device. A light aluminum tube (3 meters long) is positioned at the vapor space of the drum. A rigid, hooking device attached to the tube goes over the chime and holds the tube securely in place. The spear is inserted in the tube and positioned against the drum wall. A sharp blow on the end of the spear drives the sharpened tip through the drum and the gas vents along the grooves. Venting should be done from behind a wall or barricade. This device can be cheaply and easily designed and constructed. Once the pressure has been relieved, the bung can be removed and the drum sampled.

6.0 EQUIPMENT/APPARATUS

The following are standard programs, plans and materials and equipment required for sampling:

- Health and Safety Plan
- Personal Protective Equipment (PPE)
- Wide-mouth glass jars with Teflon[®] cap liner and approximately 500-ml volume.
- Uniquely numbered sample identification labels with corresponding data sheets.
- One-gallon covered cans half-filled with absorbent.
- Chain-of-custody sheets.
- Decontamination plan and materials.
- Glass thieving tubes and materials.
- Drum opening devices.

Bung Wrench

A universal bung wrench is commonly used to manually open drums. These wrenches have fittings to remove nearly all bung types. Wrenches are usually constructed of cast iron, brass, or a bronze-beryllium, nonsparking alloy formulated to reduce the likelihood of sparks.

The use of a "NONSPARKING" wrench does not completely eliminate the possibility of a spark being produced.

Drum Deheader

If a drum cannot be opened manually with a bung wrench, another alternative is a drum deheader. Constructed of forged steel with an alloy steel blade, this tool is designed to completely or partially cut the lid of a drum with scissor-like cutting action. A limitation of this device is that it can be attached only to closed-head drums. Drums with removable heads must be opened by other means.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|----------------------------------|---------------|
| SUBJECT: DRUM SAMPLING | NUMBER: 40 | PAGE: 3 OF: 9 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

Hand Pick, Pickaxe, and Hand Spike

These tools are usually constructed of brass or a nonsparking alloy with a sharpened point that can penetrate a drum lid or head when the tool is swung. Hand picks or pickaxes are commonly used and commercially available; spikes are generally uniquely fabricated four-foot poles with a pointed end.

Backhoe Spike

The most common tool for remotely opening drums for sampling is a metal spike attached or welded to a backhoe bucket. This is an efficient opening method that greatly reduces the likelihood of personnel exposure.

Hydraulic Drum Opener

Currently, there are fabricated hydraulic devices that can effectively open drums remotely to minimize exposure. This device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump which pressurize soil through a length of hydraulic line.

Pneumatic Devices

A pneumatic bung remover consists of a compressed air supply that is controlled by a heavy-duty, two-stage regulator. A high-pressure air line of desired length delivers compressed air to a pneumatic drill, which turns a sized fitting to remove the bung. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. This remote bung opener does not permit the slow venting of the container, therefore appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed with this device.

7.0 REAGENTS

Decontamination of sampling equipment should follow the site specific health and safety plan.

8.0 PROCEDURE

8.1 Drum Staging

Prior to sampling, the drums should be staged to allow easy access. Ideally, the staging area should be located just far enough from the drum opening area to prevent a chain reaction if a drum explodes or ignites when opened.

During staging, the drums should be physically separated into the following categories: those containing liquids, those containing solids, lab packs, gas cylinders, and those which are empty. The strategy for sampling and handling drums/containers in each of these categories will be different.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|----------------------------------|---------------|
| SUBJECT: DRUM SAMPLING | NUMBER: 40 | PAGE: 4 OF: 9 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

Drum segregation strategy entails:

- Visual inspection of the drum and its labels, codes, etc. Solids and sludges are typically disposed of in open-top drums. Closed-head drums with a bung opening generally contain liquid.
- Visual inspection of the contents of the drum during sampling, followed by restaging, is needed.

Once a drum has been excavated and any immediate hazard has been eliminated by overpacking or transferring the drum's contents, the drum is affixed with a numbered tag and transferred to a staging area. Color-coded tags, labels or bands should be used to mark similar waste types. A description of each drum, its condition, any unusual marking, and the location where it was buried or stored are recorded on a drum data sheet. This data sheet becomes the principal record-keeping tool for tracking the drum on site.

Drums suspected to contain radioactive, explosive, and shock-sensitive materials should be staged in a separate, isolated area. Placement of explosives and shock-sensitive materials in diked and fenced areas will minimize the hazard and the adverse effect of any premature detonation of explosives.

If space allows, the drum-opening area should be physically separated from the drum-removal and drum-staging operations. Drums are moved from the staging area to the drum-opening area one at a time using forklift trucks equipped with drum grabbers or a barrel grapple. In a large-scale drum handling operation, drums may be conveyed to the drum opening area using a roller conveyor.

8.2 Drum Opening

There are three basic techniques available for opening drums at hazardous waste site:

- manual opening with nonsparking bung wrenches,
- drum deheading, and
- remote drum puncturing or bung removal.

The choice of drum-opening techniques and accessories depends on the number of drums to be opened, their waste contents, and physical condition. Remote drum-opening equipment should always be considered to protect workers. Under OSHA 1910.120, manual drum opening with bung wrenches or deheaders should be performed ONLY with structurally sound drums and waste contents that are not shock sensitive, nonreactive, nonexplosive, and nonflammable.

8.2.1 Manual Drum Opening

8.2.1.1 Bung Wrench

Bung wrenches should not be used to manually open drums unless the drums are structurally sound (no evidence of bulging or deformation) and their contents are known to be nonexplosive. If opening the drum

HEALTH AND SAFETY PROCEDURES

SUBJECT:

DRUM SAMPLING

NUMBER: 40

PAGE: 5 OF: 9

DATE PUBLISHED: February 8, 1995

DATE REVISED:

with bung wrenches is deemed to be reasonably cost-effective and safe, then the following procedures should be implemented to minimize the hazard:

- Field personnel should be fully outfitted with protective gear.
- Drums should be positioned upright with the bung up, or, for drums with bungs on the side, lain on their sides with the bung plugs up.
- The wrenching motion should be a slow, steady pull across the drum. If the length of the bung wrench handle provides inadequate leverage for unscrewing the plug, a "cheater bar" can be attached to the handle to improve leverage.

8.2.1.2 Drum Deheading

Drums are opened with a drum deheader by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw to hold the deheader against the side of the drum. Moving the handle of the deheader up and down while sliding the deheader along the chime will enable the entire top to be rapidly cut off if so desired. If the top chime of a drum has been damaged or badly dented, it may not be possible to cut the entire top off. Because there is always the possibility that a drum may be under pressure, the initial cut should be made very slowly to allow for the gradual release of any built-up pressure. A safer technique would be to employ a remote opening method prior to using a deheader. Self-propelled drum openers that are either electrically or pneumatically driven are available and can be used for quick and efficient deheading.

8.2.1.3 Hand Pick or Spike

When a drum must be opened for sampling and neither a bung or wrench nor a drum deheader is suitable, use a hand pick, pickaxe, or spike. Often the drum lid or head must be hit with force to penetrate it. Because the potential for splash or spraying is greater than with other opening methods, this method of drum opening is not recommended, particularly when opening drums containing liquids. Some spikes used for this procedure have been modified by the addition of a circular splash plate near the penetrating end. This plate acts as a shield to reduce the amount of splash in the direction of the person using the spike. Even with this shield, good splash gear is essential.

Spray from drums is common and appropriate safety measures must be taken since some may be under pressure and will open quickly with these tools. The pick or spike should be decontaminated after each drum is opened to avoid cross contamination and/or adverse chemical reaction from incompatible materials.

8.2.2 Remote Opening

Remotely operated drum opening tools are the safest available means of drum opening. Remote drum opening is slow, but provides a high degree of safety compared to manual opening methods.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|----------------------------------|---------------|
| SUBJECT: DRUM SAMPLING | NUMBER: 40 | PAGE: 6 OF: 9 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

8.2.2.1 Backhoe Spike

Drums should be "staged" or placed in rows with adequate aisle space to allow ease in backhoe maneuvering. Once staged, the drums can be quickly opened by punching a hole in the drum head with the spike.

The spike should be decontaminated after each drum is opened to prevent cross contamination. Even though some splash or spray may occur when this method is used, the backhoe operator can be protected by mounting a large shatter-resistant shield in front of the operator's cage. *This should be sufficient to protect the operator.*

Additional respiratory protection can be afforded by providing the operator with an air line system on the equipment.

8.2.2.2 Hydraulic Devices

A piercing device with a metal point is attached to the end of a hydraulic line and is pushed into the drum by hydraulic pressure. The piercing device can be attached so that a hole for sampling can be made in either the side or the head of the drum.

Some metal piercers are hollow or tube-like so that they can be left in place if desired and serve as a permanent tap or sampling port.

The piercer is designed to establish a tight seal after penetrating the container.

8.3 Drum Sampling

After the drum has been opened, preliminary monitoring of headspace gases should be performed using an explosimeter and organic vapor analyzer. In most cases, it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, a sample must be taken that represents the entire depth of the vessel.

When sampling a previously sealed vessel, check for the presence of a bottom sludge. This is easily accomplished by measuring the depth to apparent bottom, then comparing it to the known interior depth of the drum.

8.3.1 Glass Thief Sampler

The most widely used instrument for sampling is a glass tube (glass thief, 6 mm to 16 mm I.D.X. 48 inch length). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate.

Specific Sampling Procedure Using a Glass Thief

1. Remove cover from sample container.

HEALTH AND SAFETY PROCEDURES

| | | |
|-------------------------------|----------------------------------|---------------|
| SUBJECT: DRUM SAMPLING | NUMBER: 40 | PAGE: 7 OF: 9 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

2. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About 1 foot of tubing should extend above the drum.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring the liquid remains within the stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Do not spill liquid on the outside of the sample container.
6. Release stopper and allow the glass thief to drain completely into the sample container. Fill the container to about $\frac{1}{2}$ of capacity.
7. Remove tube from the sample container, break it into pieces, and place the pieces in the drum.
8. Cap the sample container tightly and place pre-labeled sample container in a carrier.
9. Replace the bung or place the pieces in the drum.
10. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

In many instances, a drum containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by using a stainless-steel lab spoon.

It should be noted that in some instances disposal of the tube by breaking it into the drum may interfere with eventual plans for the removal of its contents. The use of this technique should be cleared with the project officer or other disposal techniques evaluated.

8.3.2 COLIWASA Sampler

Designs exist for equipment that will collect a sample from the full depth of a drum and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) and modification thereof. The COLIWASA is a much-cited sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism which opens and closes the sampler by raising and lowering the neoprene stopper.

The major drawbacks associated with using a COLIWASA concern decontamination and costs. The sampler is difficult if not impossible to decontaminate in the field and its high cost in relation to alternative

HEALTH AND SAFETY PROCEDURES

SUBJECT:

DRUM SAMPLING

NUMBER: 40

PAGE: 8 OF: 9

DATE PUBLISHED: February 8, 1995

DATE REVISED:

procedures (glass tubes) make it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

Procedures for Use

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.
2. Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample.)
3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.
4. Slowly withdraw the sample from the waste container with one hand, while wiping the sampler tube with a disposable cloth or rag with the other hand.
5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.
6. Cap the sample container with a Teflon[®]-lined cap; attach label and seal; and record on sample data sheet.
7. Unscrew the T-handle of the sampler and disengage the locking block. Clean sampler.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

The following general quality-assurance procedures apply:

1. All data must be documented on standard chain-of-custody forms, field data sheets, or within field/site log books.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.
3. All deliverables will receive peer review prior to release.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

DRUM SAMPLING

NUMBER: 40

PAGE: 9 OF: 9

DATE PUBLISHED: February 8, 1995

DATE REVISED:

The following specific quality assurance activity will apply:

Generally, one duplicate sample is collected for every 10 samples collected. Other duplicates and spikes may be required depending on the particular analytical parameter requested. See the site-specific sampling plan for further QA/QC considerations.

10.0 DATA VALIDATION

The data generated will be reviewed according to the QA/QC considerations included in Section 9.0.

11.0 HEALTH AND SAFETY

The opening of closed containers is one of the most hazardous site activities. Maximum efforts should be made to ensure the safety of the sampling team. Proper protective equipment and a general awareness of the possible dangers will minimize the risk inherent to sampling operations. Employing proper drum-opening techniques and equipment will also safeguard personnel. The use of remote sampling equipment whenever feasible is highly recommended.

Most drum sampling activities are performed in level B with additional splash protection. This includes:

- Protective coverall (Saran Tyvek[®] PVC, acid suit, etc.)
- Hard hat
- SCBA
- Steel toe, steel shank boot (and latex booties covering steel-toe work boots)
- Surgical gloves
- Solvent/acid-resistant gloves
- Splash apron
- Face splash shield

For detailed descriptions of required levels of protection, see EPA/REAC Standard Operating Procedure No. 3012, "Hazardous Waste Site Investigations," and the site-specific safety plan.

12.0 REFERENCES

Guidance Document for Cleanup of Surface Tank and Drum Sites, OSHA Directive 9830.0-3

Drum Handling Practices at Hazardous Waste Sites, EPA-600/2-86-013

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HEALTH AND SAFETY PROCEDURES

SUBJECT:

COLD STRESS

NUMBER: 41

PAGE: 1 OF 3

DATE PUBLISHED: February 8, 1995

DATE REVISED:

1.0 POLICY

Project supervisors must be aware of the symptoms and causes of cold-related illnesses and take appropriate steps to prevent their occurrence.

2.0 PURPOSE

This procedure describes the symptoms, treatment, and/or prevention of cold-related illness.

3.0 SYMPTOMS

When exposed to cold temperature and/or cold water, the body reacts instinctively in a pattern designed to preserve itself. When the brain recognizes any dangerous temperature drop in the body core, it signals the body to make adjustments to compensate for the imbalance. In an attempt to preserve normal temperatures in the vital internal organs, the blood vessels in the extremities constrict (vasoconstriction). This slows the blood flow to the arms and legs, preserving energy and warm blood for the body core. If heat loss continues and the body core temperature drops below 95°F (35°C), the body then tries to generate more heat through shivering, which causes metabolic heat production to increase to several times the normal rate. Shivering is the first real warning sign of hypothermia. Further heat loss, accompanied by a body core temperature drop to 90°F (32.2°C) or below, results in speech difficulty, loss of manual dexterity, slow reactions, mental confusion, and muscle rigidity (muscle hypertonias). If exposure continues until the body's resources are exhausted, and if the cold blood reaches the heart and brain, heart failure and coma will result and inevitably lead to death. Death occurs when the body core temperature falls below 78°F (25.6°C).

4.0 COLD-RELATED ILLNESSES

4.1 Frostbite

If exposure occurs in temperatures that are below freezing (30°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Injury due to frostbite may range from superficial redness of the skin, slight numbness, and blisters, to the obstruction of blood flow (ischemia), blood clots (thrombosis), or skin discoloration due to insufficient oxygen in the blood (cyanosis). Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration. Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

COLD STRESS

NUMBER: 41

PAGE: 2 OF 3

DATE PUBLISHED: February 8, 1995

DATE REVISED:

4.2 Hypothermia

Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years.

5.0 TREATMENT

If hypothermia occurs, certain first aid procedures can mean the difference between life and death for the victim. These include the following (as a general rule, treat all injuries in the order of their importance to preserving life):

5.1 For Hypothermia:

1. Give artificial respiration and stop any bleeding, if necessary.
2. Bring the victim into a warm room or shelter as quickly as possible.
3. If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets or some other insulation between the victim and the ground.
4. Remove all wet clothing.
5. Provide an external heat source since the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.
6. Do not allow the victim to sleep.
7. Give warm, sweet drinks -- no alcohol or pain relievers.
8. Keep the victim still. Do not try to walk.
9. Do not rub numb skin.
10. Get medical help as soon as possible.

HEALTH AND SAFETY PROCEDURES

| | | |
|-----------------------------|----------------------------------|---------------|
| SUBJECT: COLD STRESS | NUMBER: 41 | PAGE: 3 OF: 3 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

5.2 For Frostbite:

1. Wrap the victim in woolen cloth and keep dry until he or she can be brought inside.
2. Do not rub, chafe, or manipulate frozen parts.
3. Bring the victim indoors.
4. Place the victim in warm water (102°F to 105°F) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold. The affected area may be refrozen.
5. Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
6. Do not allow the victim to walk if his or her feet are affected.
7. Have the victim gently exercise the affected parts once they are thawed.
8. Seek medical aid for thawing of serious frostbite; the pain will be intense and tissue damage will be extensive.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEARING CONSERVATION

NUMBER: 42

PAGE: 1 OF: 3

DATE PUBLISHED: February 8, 1995

DATE REVISED:

1.0 POLICY

Preventing hearing loss due to excessive workplace noise exposure is a primary objective of EARTH TECH. To achieve this objective, the following policy on hearing conservation has been instituted to comply with 29 CFR 1910.95.

2.0 REQUIREMENTS

All employees exposed to 85 dBA time-weighted average (TWA) for eight hours will be included in a Hearing Conservation Program. All employees exposed to 90 dBA (TWA) for eight hours will be required to wear hearing protectors.

3.0 AUDIOMETRIC HEARING TESTS

1. Qualified medical personnel will conduct a baseline audiogram on all EARTH TECH personnel who meet the criteria of noise exposure as stated in this policy. Thereafter, annual audiograms will be compared with the baseline exam. All field personnel will receive a baseline audiogram prior to employment.
2. The frequencies tested will be 250, 500, 1,000, 2,000, 3,000, 4,000, 6,000, and 8,000 Hz. When not feasible, due to equipment incapability or background ambient noise, 250 Hz and 8,000 Hz may be excluded.
3. When a Standard Threshold Shift (STS) is noted between the last valid baseline and the annual audiogram, the following steps will be taken:
 - a. A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours and/or will be provided with adequate hearing protection prior to testing.
 - b. If the STS persists, ear protection will be upgraded to one with a greater Noise Reduction Rating (NRR).
 - c. The employee will be counseled, and EARTH TECH will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.
 - d. Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.
 - e. The employee will be notified in writing by the Industrial Hygiene Department of the STS, within 21 days of determination, as required by OSHA.
 - f. The employee's supervisor will be notified of the shift in hearing threshold.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HEARING CONSERVATION

NUMBER: 42

PAGE: 2 OF 3

DATE PUBLISHED: February 8, 1995

DATE REVISED:

- g. If the employee who has experienced an STS is exposed to 85 dBA for 8 hours or 80 dBA for 12 hours, mandatory use of ear protection is required.
- h. Temporary employees will receive audiograms during their exit physicals.

4.0 MONITORING OF NOISE LEVELS

The Health and Safety Officer will monitor personal and environmental noise levels using noise dosimetry to determine the need for employees to be enrolled in the Hearing Conservation Program. EARTH TECH will periodically monitor noise levels during site operations to document personnel exposure levels. EARTH TECH will implement engineering controls will be implemented if boundary noise levels exceed 10 dBA above background levels.

5.0 HEARING PROTECTORS

- A. Hearing protection will be mandatory for all employees exposed to 90 dBA for 8 hours and 85 dBA for 12 hours.
- B. Hearing protectors will be made available to all employees exposed to 85 dBA for 8 hours or greater.
- C. Hearing protection will be mandatory for all employees exposed to 85 dBA for 8 hours and who have experienced an STS.
- D. The Industrial Hygiene Department will fit and initially issue all hearing protection. All employees issued hearing protection will be trained in the proper use, care, and maintenance of the protectors.
- E. EARTH TECH will offer at least three hearing protector devices.
- F. All hearing protection will carry a NRR of at least 26 dBAs and be approved by the Industrial Hygiene Department prior to use in the field.

6.0 RETENTION OF RECORDS

- A. Noise exposure measurement records will be retained for three years.
- B. Audiometric test records will be retained for the duration of employment, plus 40 years.
- C. Annual employee training session documentation will be retained for the duration of employment.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|----------------------------------|---------------|
| SUBJECT: HEARING CONSERVATION | NUMBER: 42 | PAGE: 3 OF: 3 |
| | DATE PUBLISHED: February 8, 1995 | |
| | DATE REVISED: | |

7.0 TRAINING PROGRAM

- A. All employees exposed to noise at or above 85 dBA (TWA) for 8 hours, or 80 dBA (TWA) for 12 hours, will participate in an annual training program.
- B. The training program will focus on:
- The effects of noise;
 - The purpose of hearing protectors, their advantages and disadvantages, and use and care; and
 - The purpose and procedure of audiometric testing.

I W P FORMS' H&S PROCEDURE HEARING 42

HEALTH AND SAFETY PROCEDURES

SUBJECT:

TANK CLEANING

NUMBER: 43

PAGE: 1 OF: 2

DATE PUBLISHED:

DATE REVISED:

1.0 POLICY

Each EARTH TECH work site will be identified, categorized, and follow a work procedures program to assure the health and safety of employees who are required to participate in or work around tank excavation and removal. This document will review the associated hazards and safety procedures.

2.0 DEFINITION OF ACTIVITIES

- A. Properly dispose of any liquids or gases remaining in the tank.
- B. Sample and analyze the contents, if any, of the tanks.
- C. Render the atmosphere within the tank inert (atmosphere <10% lower explosive limit and/or oxygen content <5%).

3.0 HAZARDS OF TANK CLEANING

- A. Hazardous atmospheres in and around tanks.
- B. Direct inhalation or dermal exposure to hazardous materials.

4.0 SAFETY PROCEDURES

- A. Removal of Liquid and Sludge from Tanks
 - 1. Disconnect or remove sources of ignition from the vicinity of the tank before venting or removal operations start.
 - 2. Personnel conducting the removal operations shall be appropriately protected from harmful exposure to toxic or corrosive vapors or gases.
 - 3. Empty the tank of all liquids, including the removal of liquids from any internal piping.
 - 4. Liquid or residue shall be removed as completely as possible using vacuum systems or pumps prior to tank excavation and removal.
 - 5. Blank or disconnect all piping to the tank.
 - 6. Site personnel shall remain upwind of operations whenever feasible.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

TANK CLEANING

NUMBER: 43

PAGE: 2 OF: 2

DATE PUBLISHED:

DATE REVISED:

B. Removal of Flammable Vapors

1. Inerting of vapor space shall be performed by a qualified individual thoroughly familiar with the limitations and characteristics of the inerting gas being used.
2. Close all openings in the tank with the exception of the filling connection and vent.
3. Introduce inerting gas at a point near the bottom of the tank.
4. A combustible gas/oxygen meter shall be used to remotely monitor the atmosphere within the tank.

C. Miscellaneous Toxics

Potential health hazards generated during the cleaning process (e.g., solvents) will be monitored with appropriate sampling media.

Forms/sop/tankclea 43

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 1 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

1.0 POLICY

All employees of Earth Tech and all outside contractors working for Earth Tech will be provided information on the hazards associated with the employee's task.

2.0 PURPOSE

The purpose of this program is to ensure that all employees (including seasonal and part-time) of Earth Tech and outside contractors working within the facilities of the company, are aware and knowledgeable of the hazards they may be exposed to or work with.

3.0 PROGRAM

3.1 Hazard Identification

Materials used in all facilities will be reviewed to determine if hazardous ingredients exist solely or in combination with other components. All new materials entering the facilities must be accompanied or preceded with a valid material safety data sheet (MSDS).

3.2 Container Labeling

Each container of material entering any of the facilities must be properly labeled by the manufacturer or supplier. Such labeling should include material name, a description of associated hazards (physical and health hazards), first-aid measures, personal protective equipment and emergency phone numbers.

Any container received without proper labeling cannot enter the site until properly labeled.

3.3 Material Safety Data Sheets (MSDSs)

All hazardous materials must be a MSDS furnished by either the supplier and/or received without proper information requires immediate contact with the supplier or manufacturer to request necessary information. MSDSs must be maintained in an orderly fashion and be available for any employee to read.

3.4 Posters

Posters will be posted as required per state-specific programs. These posters must be posted and available to all employees.

3.5 Pipe/Vessel Labeling

Pipes or piping systems and vessels containing hazardous materials must be labeled. The responsibility for proper labeling is vested in the PM/RM.

3.6 Employee Information and Training Programs

Will be conducted regarding:

- a. Requirements of the regulation,
- b. Hazardous chemical or materials in the work area,

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 2 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

- c. Location of the written Hazards Communication Program,
- d. Methods of detecting the presence or release of a hazardous material,
- e. Physical and health hazards of chemicals or materials,
- f. Measures employees can take to protect themselves from chemical hazards,
- g. Explanation of container labels, and
- h. Explanation of the material safety data sheet (MSDS) and how to read and understand them.

3.7 Contractor Notification

In the event outside contractors' employees are working in the facilities, the SSO and/or PM/RM is responsible for informing the contractor of any associated hazards their employees may be exposed to (see enclosures). Additionally, any materials being brought into any of the facilities requires the contractor to furnish MSDSs to the SSO or PM/RM prior to bringing the material(s) on the site.

3.8 Earth Tech

Assumes no responsibility for evaluation of chemical hazards associated with products (either purchased or on trial). The Company will rely on such evaluations being completed by the material manufacturer or supplier. Additionally, the Company assumes no responsibility for information contained on MSDSs either in content, accuracy or format of the MSDS.

3.9 Acquisition of Materials

Requires the determination of potential hazards. All new materials acquired, either production or trial, require evaluation before introduction into the sites. The determination is made via the MSDS and it must be requested at the time facilities ordering a new product or before a trial material is received.

3.10 Deletion of Materials

Requires notification of the SSO or PM/RM. The MSDS must not be destroyed! Any MSDS associated with a deleted material requires the MSDS to be marked as obsolete and the date it was obsolete. The MSDS should then be placed in an inactive file and retained indefinitely, See Section I of this Hazard Communication.

4.0 HAZARDOUS CHEMICAL/SUBSTANCE LABELING

All incoming materials must be labeled by the site where they are received.

4.1 Labeling Procedure

The evaluation requires the site receiving the material to:

- A. Review the Material Safety Data Sheet book and/or inventory printout and determine the proper MSDS number for the received material.
- B. Affix an HMIS Identification Label to each container and enter
 - 1. MSDS number in the white portion of the label,
 - 2. Health, fire and reactivity numbers in the appropriate area of the label, and Personal protective equipment code in the appropriate space.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 3 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

- Once the proper labeling is affixed, the containers(s) may be placed on site.
- All hazardous chemical substance labels shall have the MSDS number and hazard ratings affixed. In the event a site eliminates a material, the SSO or PM/RM must be notified so the material safety data sheet (MSDS) may be deleted from the active file.
- Labeling of containers is mandatory if the container is used by other than the person transferring the material or, if the container and contents will be used beyond one shift.
- A "container" is defined as anything holding hazardous chemicals or substances. This may include pipe and piping systems.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 4 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

EARTH TECH INTERNAL CONTAINER LABELING SYSTEM

A system is incorporated company-wide which provides a simple means for the employee to quickly identify the associated hazards of material in a labeled container.

This identification system incorporates the Hazardous Materials Information System (HMIS) label. The label consists of a rectangular shape which is divided into the following sections:

| | | |
|--------|-----------|------------------------|
| BLUE | ~ ~ ~ ~ ~ | Health Hazard, |
| RED | ~ ~ ~ ~ ~ | Fire Hazard, |
| YELLOW | ~ ~ ~ ~ ~ | Reactivity Hazard, and |
| WHITE | ~ ~ ~ ~ ~ | PPE Required |

Additionally, this labeling system incorporates a numerical system for identification of the degree of hazard as follows:

| | | |
|---|-----------|-----------------|
| 0 | ~ ~ ~ ~ ~ | Minimal hazard |
| 1 | ~ ~ ~ ~ ~ | Slight hazard |
| 2 | ~ ~ ~ ~ ~ | Moderate hazard |
| 3 | ~ ~ ~ ~ ~ | Serious hazard |
| 4 | ~ ~ ~ ~ ~ | Severe hazard |

Earth Tech has incorporated another item to assist the employee with location of material safety data sheets. All material safety data sheets have a numerical number assigned which is placed at the top of the HMIS label.

The material safety data sheets are maintained by materials used on site and are maintained by the SSO and/or RM. The employee needs to only look up the MSDS to obtain more information about the contents of the container.

5.0 MATERIAL SAFETY & DATA SHEETS (MSDSs)

Each site is required to acquire and place in an orderly fashion, a material safety data sheet (MSDS) for each material classified as or containing "hazardous substances". The sheets are kept in numerical order in a three ring binder which is labeled "Material Safety Data Sheets" and placed so the binder and sheets are available to any employee at any time.

The MSDSs are acquired from the manufacturer or supplier of the product. Acquisition of the MSDSs is the responsibility of the SSO or RM.

This site has established an alphabetical file system for MSDS. The MSDS are filed using their common names alphabetically.

HEALTH AND SAFETY PROCEDURES

| | | |
|--------------------------------------|------------------------------|--------------|
| SUBJECT: HAZARD COMMUNICATION | NUMBER: 54 | PAGE: 5 OF 8 |
| | DATE PUBLISHED: January 2001 | |
| | DATE REVISED: New | |

The number assigned to the individual MSDS will be used in conjunction with the internal HMIS labeling system by placing the MSDS number in the top portion of the MSDS label.

When a material is no longer used (obsolete material) at the site, the appropriate MSDS must be marked as obsolete. The number that is assigned to the obsolete MSDS must be retired.

Each employee will be taught how to read an MSDS and find necessary information on the sheet.

5.1 *MSDS Explanation*

The following is an explanation of an MSDS (Material Safety Data Sheet). The explanation includes a description of the information in each section and why the information is important.

5.1.1 *Material Identification*

This section identifies the material and the supplier. The MSDS material must match the name on the container. If the material has more than one name, each is listed. The chemical formula may be given. A National Fire Protection Association hazardous-rating fire diamond may appear. This gives at-a-glance number ratings for the particular material's degree of flammability, reactivity, and health hazard.

Thousands of materials with many similar names are found in workplaces. A mistake on the supplier's part in sending the wrong sheet needs to be caught immediately. Having the supplier's telephone number on the sheet can be a vital time-saver in the event of an accident involving the material, or for additional information.

5.1.2 *Ingredients and Hazards*

Section 2 lists the product's individual hazardous chemicals and their relative percentage of concentration. If established, each chemical's exposure limits are shown. For example, the phrase "8-hr TWA 100 ppm or 300 mg/m³" is a guideline establishing an exposure that should not be exceeded when averaged over an eight-hour workday.

By law, suppliers need to identify only hazardous ingredients. Some trade name products have secret ingredients termed trade secrets that are treated as proprietary information.

Suppliers of such products must still provide health hazard data on the MSDS and additional information to safety professionals if they have a documented need to know. Exposure to certain hazardous materials may be acceptable, but only for periods of time (not to exceed certain limits and at concentrations of the materials no greater than certain limits.) These limits can be learned from the MSDS. Should the job involve exposure for greater periods of time or at higher concentration, employees must know that wearing protective clothing or taking other protective measures as described on the MSDS is vital to his/her health.

Exposure levels are set for most healthy adult workers. Lower exposure levels are necessary for persons at higher risk (ie: those who are elderly, pregnant, younger workers, smokers, etc.) or workers who have already been exposed to other materials for which exposure limits have been set. Exertion increases the effects of exposure.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 6 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

Exposure to more than one hazardous substance at a time can be especially harmful because the combined effects of more than one material can prove to be more damaging than the effect of a single material. This is called "synergy." Some examples are asbestos, tobacco smoke, chlorinated solvents, and alcoholic beverages.

5.1.3 *Physical Data*

Physical data include a material's boiling point, solubility in water, viscosity, specific gravity, melting point, evaporation rate, molecular weight, appearance, odor, etc.

Safe handling is ensured when the user knows ahead of time how a material will behave at different temperatures or when it is exposed to water, etc. For example, butanol has a 2.55 vapor density, which means it is heavier than air (which has a vapor density of 1.) This means that butanol vapor will fall to the floor or ground in still air, such as is found in a tunnel or tank. The butanol vapor can flow to a possible source of ignition and then flash back, or it can overwhelm an individual if he/she enters the enclosed space where it has collected.

If a material has a low boiling point, high vapor pressure, fast evaporation rate and a high percentage of volatility, it is very likely to be an inhalation hazard, and special ventilation or a breathing apparatus may be necessary. If the material is also flammable or toxic, even stronger precautions will be necessary. The higher the temperature, the more active the material, ie: the faster it evaporates, reacts, etc.

5.1.4 *Fire and Explosion Data*

Section 4 of the MSDS indicates what protective clothing or respiratory equipment fire fighters should use and what type of extinguishing materials best fight the fire. All employees need to be ready with preplanned response procedures and equipment.

The flammability data combined with the information in the physical data section of the MSDS give you a good indication of how hazardous the material is. At a glance an individual can tell from a low flash point that a material represents a fire hazard; for example, the flash point of gasoline is -45°F .

The flash point is the lowest temperature at which a flammable liquid gives off enough vapor to form an ignitable mixture with air. The auto-ignition temperature tells how hot a material must be before it will set itself on fire without a flame or spark.

When there is a fire, and time is scarce, section 4 of the MSDS will remind individuals of the best way to fight the fire and the precautions that fire fighters should take. Some burning materials can react with water and may best be smothered with foam, a gas (CO_2 or Halon), or powder.

With most fires the greatest danger to human life comes not from the heat of the flames but from the often-toxic smoke that can quickly fill the work area. Employees should know not to watch a fire, but to leave the site quickly and report it.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 7 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

5.1.5 *Reactivity Data*

The information found in section 5 varies greatly from one MSDS to another. The information presented should focus on the materials and circumstances that could be most hazardous when combined with the material covered by the MSDS.

Materials can be stored and handled effectively and safely when employees know how it may react to changes in temperature or contact with other materials. This section will help employees know if the material will polymerize (react with itself), a phenomenon that can cause a rapid buildup of heat and pressure that can lead to an explosion.

The information in this section will be a guide for employees' choices of materials for containers, shelving, and personal protection clothing and devices. For example, if the material reacts with metal, it should be stored on non-metal shelves. If the material reacts with natural rubber, an individual should not wear a respirator or gloves made of natural rubber.

Some materials are inherently unstable or react with other common materials to produce by-products that can be toxic. Otherwise harmless plastic sheeting can form a deadly gas when burned.

5.1.6 *Health Hazard Information*

Employees can be adversely exposed to a harmful chemical through several routes of entry into the body, including eye contact, skin contact, inhalation, and ingestion (swallowing). Section 6 of the MSDS must describe all of the routes of entry pertinent to this particular material. Acute (immediate) and chronic (long-term) health effects must be stated. If the material is carcinogenic, that fact must be stated. Medical and first-aid treatments for accidental exposure will be described.

Sickness and even death from improper exposure to certain chemical materials can be prevented if an individual is aware of the potential hazards ahead of time.

Professional medical treatment should be obtained as soon as possible after an accident. However, actions taken in the first few minutes after an exposure can make the difference between a minor and a major injury. For example, battery acid is splashed into the eyes, the more quickly the individual begins washing out the eyes with water, the more likely he/she is to save his/her eyesight. Employees should know the first-aid measures for a material before working with it.

Chronic effects are particularly dangerous because discomfort may not be experienced in the presence of the material, but severe health problems may develop later in life as a result of the exposure. Some materials harm a particular "target organs" of the body, such as, heart, liver, lungs, kidneys, etc.

Inhalation: The principal route of entry into the body is through inhalation.

However, not all materials that are dangerous actually have bad odors. Many dangerous chemicals have very little odor or have the ability to quickly fatigue the sense of smell so that the individual is no longer aware of the odor but is still being hurt through exposure to toxic concentrations.

HEALTH AND SAFETY PROCEDURES

SUBJECT:

HAZARD COMMUNICATION

NUMBER: 54

PAGE: 8 OF 8

DATE PUBLISHED: January 2001

DATE REVISED: New

Contact and Ingestion: some materials can pass right through the skin to react with body tissue and be absorbed into the internal organs. It can be ingested in small amounts by eating, drinking, smoking – even licking a finger to turn a page – with hands exposed to chemicals in the workplace. The amounts accidentally swallowed may be small but can cause toxic effects or even kill if the material, like lead, mercury, cyanide, or arsenic, is toxic enough. Contact lenses absorb and concentrate irritants and should not be worn in the workplace.

5.1.7 *Spill, Leak, and Disposal Procedures*

Safe work practices to follow in the event of an accident with a particular material are described. The methods and procedures for proper handling of spills, leaks, and disposal of wastes must be read and understood.

Section 7 advises you on how to remedy a spill while safeguarding health and environment from further damage. Equally as important, the containment and cleanup techniques described will likely reflect compliance with Federal, State and Local laws and regulations.

Knowledge about a material gained from the MSDS enables individuals to preplan for emergency response and waste disposal by training staff and placing necessary equipment in the work area.

5.1.8 *Special Protection Information*

Methods for reducing exposure to a particular hazardous material are described. The methods may include ventilation requirements, breathing apparatus, and protective clothing (such as gloves, aprons, and safety glasses). Instructions for the care and disposal of contaminated equipment and clothing are given.

When the job responsibility includes working directly with a particular material, this section of the material's MSDS tells the employee what specific steps and precautions to take to safeguard his/her health as he/she goes about his/her work. The caution in this, and other sections of the MSDS, carry the force of the law. If the MSDS states that gloves should be worn or that it is necessary to maintain a certain level of ventilation, it is the employer's responsibility to provide the particular equipment or safe working conditions required by the amount of material and the exposure to it. It is the employee's responsibility to utilize them.

To reduce exposure, overall engineering controls in the workplace are better than personal protective equipment. "Administrative Controls" limits the time a worker does a specific job.

HEALTH AND SAFETY PROCEDURES

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HAZARD COMMUNICATION

NUMBER: 54

PAGE: 9 OF 8

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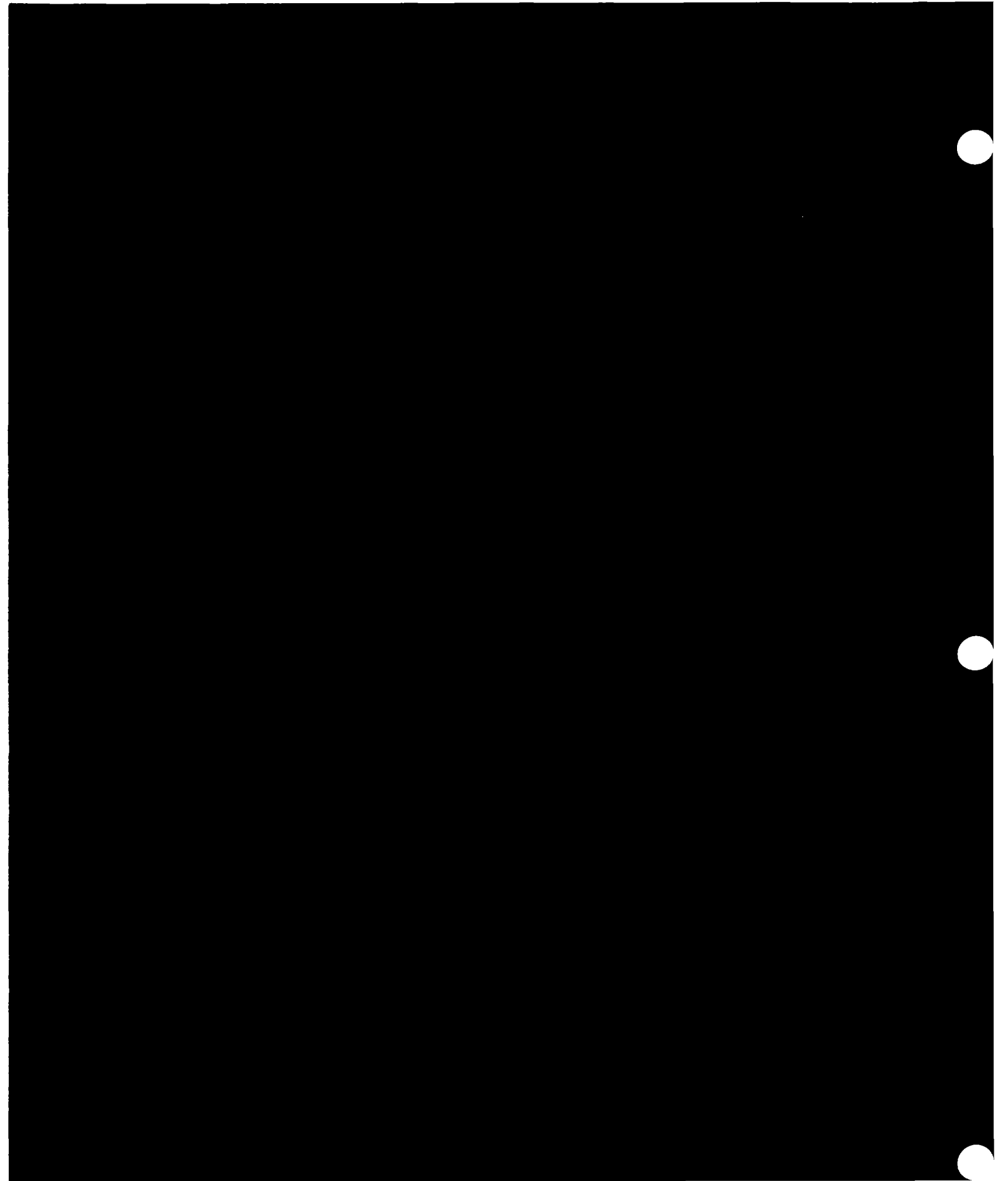
DATE REVISED: New

5.1.9 *Special Precautions and Comments*

Safe storage and handling of the material is described in section 9. The types of container labels or markings are described, and particular Department of Transportation (DOT) policies for handling the material are listed.

Stored containers cannot be assumed to be safe. Containers corrode, and lids leak. Sparks or heat can cause fires or explosions. Shipping or storing incompatible materials close together can cause dangerous reactions. In addition, section 9 may include comments regarding the material that do not particularly fit the content of other sections of the MSDS for example, an individual may be notified about techniques for the proper disposal of empty containers or a particularly important hazard or safety practice may be reemphasized.

ADDITIONAL HEALTH AND SAFETY FORMS AND THE
EXPOSURE CONTROL PLAN FOR AIRBORNE PATHOGENS



Exposure Control Plan for Bloodborne Pathogens

Prepared by:
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Table of Contents

| | | |
|-----------|---|---|
| 1.0 | INTRODUCTION..... | 1 |
| 1.1 | Definitions | 1 |
| 1.1.1 | Hepatitis B Virus..... | 1 |
| 1.1.1.1 | Hepatitis Exposure Symptoms..... | 1 |
| 1.1.2 | Human Immunodeficiency Virus | 1 |
| 1.1.2.1 | Human Immunodeficiency Virus Exposure Symptoms..... | 1 |
| 1.2 | Exposure Determination | 2 |
| 1.2.1 | Means of Transmission..... | 2 |
| 1.3 | Measure of Prevention | 2 |
| 1.3.1 | Universal Precautions | 2 |
| 1.3.2 | Engineering Controls..... | 2 |
| 1.3.3 | Work Practice Controls | 3 |
| 1.3.3.1 | Minimization of Contact | 3 |
| 1.3.4 | Personal Protective Equipment..... | 4 |
| 1.3.5 | Waste Handling and Disposal..... | 4 |
| 1.4 | Medical Requirements | 6 |
| 1.4.2 | Post-Exposure Management..... | 6 |
| 1.4.2 | Post-Exposure Procedures and Evaluation | 7 |
| 1.4.2.1 | Documentation Procedures | 7 |
| 1.4.2.2 | Blood Testing..... | 7 |
| 1.4.2.2.1 | Source Individuals..... | 7 |
| 1.4.2.2.2 | Exposed Employees | 8 |
| 1.4.3 | Post-Exposure Medical Evaluations..... | 8 |
| 1.5 | Hazard Communication | 8 |
| 1.5.1 | Warning Labels | 8 |
| 1.5.2 | Warning Signs | 8 |
| 1.5.3 | Employee Training Program - Voluntary Providers..... | 8 |
| 1.5.4 | Employee Training Program - Designated Providers..... | 8 |
| 1.6 | Recordkeeping | 9 |
| 1.6.1 | Training Records | 9 |
| 1.6.2 | Medical Records..... | 9 |
| 1.6.2.1 | Confidentiality | 9 |
| 1.6.2.2 | Maintenance and Transfer of Records | 9 |
| 1.6.3 | Incident Recording | 9 |

1.0 INTRODUCTION

This Exposure Control Plan presents health and safety guidelines for voluntary and designated first aid and cardiopulmonary resuscitation (CPR) care providers. In order to meet the requirements of Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) &1910.151, during day shift operations, at least one person on site will be adequately trained in first aid and CPR, in the requirements of the Bloodborne Pathogens Standard as listed in 29 CFR &1910.1030, and in the contents of this plan.

1.1 Definitions

Bloodborne pathogens are those agents (i.e., bacteria, virus, fungi) found in blood, blood components, certain body fluids, and other materials, objects, or surfaces that have had contact with blood that are capable of causing human disease or death to unprotected people who came into contact with blood or blood-affected items. Diseases caused by bloodborne pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, and syphilis. The most significant and of greatest concern are HBV and HIV.

1.1.1 Hepatitis B Virus

HBV is the major bloodborne pathogen hazard that first aid/CPR care providers are more likely to encounter. The HBV can remain infectious for up to 10 days even in dried blood. The virus adversely affects 8,000 to 10,000 workers annually resulting in approximately 200 deaths each year.

1.1.1.1 Hepatitis Exposure Symptoms

Hepatitis means "inflammation of the liver" causing severe liver damage or cirrhosis. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period of time.

Presently, no cure exists for hepatitis, but it can be prevented with a vaccination.

1.1.2 Human Immunodeficiency Virus

HIV attacks and deteriorates the body's immune system and eventually weakens it to the point that infection set in causing the disease Acquired Immune Deficiency Syndrome (AIDS). HIV is primarily transmitted through sexual contact, but may also be transmitted through contact with blood and body fluids. HIV is not transmitted by touching or working with people who are HIV-positive.

1.1.2.1 Human Immunodeficiency Virus Exposure Symptoms

HIV leads to AIDS-related illnesses which eventually cause neurological problems, cancer, pneumonia, and death. People carry the virus for many years of their lives without experiencing any symptoms. Upon development, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, or swelling of the lymph glands.

Presently, no cure exists for HIV or AIDS and no vaccination is currently available.

1.2 Exposure Determination

The guidelines in this plan are designed to limit occupational exposure of site workers to infectious blood materials which could result in disease and possible death. The contents of this plan are intended to protect the Earth Tech employees trained in first aid and CPR who are responsible for administering medical assistance to site workers.

1.2.1 Means of Transmission

The major activity that may expose any of these Earth Tech employees to bloodborne pathogens is their response to and care of on-site personal injuries or decontamination of equipment/surfaces contaminated by blood or other potentially infectious materials during the incident.

These Earth Tech employees could be subject to bloodborne pathogens during rendering of first aid or CPR by accidental exposure due to:

- Punctures through the skin with a contaminated sharp object (e.g., scissors)
- Contact or absorption of blood or blood-contaminated objects through open or broken skin (e.g., cuts, scratches, rashes)
- Blood splashes to their eyes, nose, or mouth or other mucous membranes.

Workers can reduce their risk of contacting HBV or HIV by implementing the work practices outlined in this plan before, during, and after responding to emergency medical incidents involving personal injuries.

1.3 Measure of Prevention

The establishment of work practices controls is an integral part of an effective exposure control plan in preventing accidental infection of employees. These work practices are designed to protect employees from reasonably foreseeable occupational exposures to bloodborne pathogens from blood and other potentially infectious material. The work practice controls outlined in this section are applicable to the administration of first aid in emergency situations and subsequent cleanup only.

1.3.1 Universal Precautions

Universal precautions is an approach to infection control which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be contaminated with HIV, HBV, or other infectious diseases. Universal precautions shall be implemented whenever there exists a foreseeable potential for contact with blood or bodily fluids.

1.3.2 Engineering Controls

Due to the remote location of the worksite, the nature of work in outdoor locations with potential exposure to airborne chemical contaminants, and the potential for exposure being limited to emergency situations, the implementation of engineering controls is not feasible. Exposure control shall be accomplished through implementation of work practice controls and use of personal protective equipment.

1.3.3 Work Practice Controls

Work practice controls shall be instituted whenever foreseeable potential contact with, or exposure to, blood and bodily fluid exists. Examples of situations in which these controls are to be implemented include, but are not limited to, accidents or injuries in which administration of first aid is required, application of bandages to minor cuts and abrasions of another person, and contact with sores, wounds, or broken skin.

Following are specific work practice controls that shall be implemented:

- Open wounds or cuts will be promptly bandaged.
- Wash hands and face as soon as possible after administering first aid or CPR. If wash facilities are not readily available, stock disposable one-time use towelettes.
- No eating, drinking, or smoking is allowed in any work area where a potential exists for occupational exposure to blood borne pathogens.
- Non-disposable equipment or materials that have or may have blood or infectious fluid contact must be washed immediately after their use. (A 1-to-10 solution of bleach and water is recommended for proper decontamination.)
- Any clothing that becomes contacted with blood or infectious fluids shall be removed as soon as possible after administering first aid or CPR.
- No personal clothing that becomes contacted with blood or infectious fluids shall be laundered off-site.
- Ensure that first-aid kits on-site are equipped with a pair of surgical gloves and CPR mouth pieces.

1.3.3.1 Minimization of Contact

Direct contact with blood and bodily fluids should be kept to an absolute minimum, as required in a particular situation. In situations where direct contact is likely, personal protective equipment shall be worn to help prevent infection.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if he determines that the use of PPE will further jeopardize his well-being or that of the injured worker. This limited application must be carefully evaluated by the employee.

If this does occur, Earth Tech is obligated to investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

1.3.4 Personal Protective Equipment

The following are specific personal protective equipment items that shall be implemented:

- Always wear hand (i.e. latex or nitrile surgical gloves) and eye (i.e. safety glasses, goggles) protection to administer or apply first aid or CPR.
- Full-body protective clothing (Saranex)
- Respirators [full-face, air-purifying respirators (APRs) with MSA GMC-H cartridges will be worn if the potential for airborne mists/vapors/particulates are generated during bloodborne pathogen cleanup]

1.3.5 Waste Handling and Disposal

The only documented occupational risks of HIV and HBV infection are associated with parenteral (including open wound) and mucous membrane exposure to blood and other potentially infectious body fluids. Nevertheless, the precautions described below should be routinely followed.

1. Needle and sharps disposal

All workers should take precautions to prevent injuries caused by needles, scalpel blades, and other sharp instruments or devices during procedures; when cleaning used instruments; during disposal of used needles; and when handling sharp instruments after procedures. To prevent needle-stick injuries, needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. After they are used, disposable syringes and needles, scalpel blades, and other sharp items should be placed in puncture-resistant containers for disposal; the puncture-resistant containers should be located as close as practical to the use area (e.g., in the use area or, if sharps are carried to the scene of victim assistance from the ambulance, a small, puncture-resistant container also should be carried to the scene). Reusable needles should be left on the syringe body and should be placed in the puncture-resistant container for transport to the reprocessing area.

2. Hand washing

Hands and other skin surfaces should be washed immediately and thoroughly if contaminated with blood, other body fluids to which universal precautions apply, or potentially contaminated articles. Hands should always be washed after gloves are removed, even if the gloves appear to be intact. Hand washing should be completed using the appropriate facilities, such as utility or restroom sinks. Waterless antiseptic hand cleanser should be provided on responding units to use when hand-washing facilities are not available. When hand-washing facilities are available, wash hands with warm water and soap; when they are not, use waterless antiseptic hand cleanser. The manufacturer's recommendations for the product should be followed.

3. Cleaning, disinfecting, and sterilizing

Table 3 in Appendix 1 presents the methods and applications for cleaning, disinfecting, and sterilizing equipment and surfaces in the pre-hospital setting. These methods also apply to housekeeping and other cleaning tasks.

4. Cleaning and decontaminating spills of blood

All spills of blood and blood-contaminated fluids should be promptly cleaned up using an EPA-approved germicide or a 1:1000 solution of household bleach in the following manner, **while wearing gloves**. Visible material should first be removed with disposable towels or other appropriate means that will ensure against direct contact with blood. If splashing is anticipated, protective eyewear should be worn along with an impervious gown or apron which provides an effective barrier to splashes. The area should then be decontaminated with an appropriate germicide. Hands should be washed following removal of gloves. Soiled cleaning equipment should be cleaned and decontaminated or placed in an appropriate container and disposed of according to agency policy. Plastic bags should be available for removal of contaminated items from the site of the spill.

Shoes and boots can become contaminated with blood in certain instances. Where there is massive blood contamination on floors, the use of disposable impervious shoe coverings should be considered. Protective gloves should be worn to remove contaminated shoe coverings. The coverings and gloves should be disposed of in plastic bags. A plastic bag should be included in the first-aid kit or vehicle to be used for the disposal of contaminated items. Extra plastic bags should be stored in the emergency vehicle.

5. Laundry

Although soiled linen may be contaminated with pathogenic microorganisms, the risk of actual disease transmission is negligible. Rather than rigid procedures and specifications, hygienic storage and processing of clean and soiled linen are recommended. Laundry facilities and/or services should be made routinely available by the employer. Soiled linen should be handled as little as possible and with minimum agitation to prevent gross microbial contamination of the air and of persons handling the linen. All soiled linen should be bagged at the location where it was used. Linen soiled with blood should be placed and transported in bags that prevent leakage. Normal laundry cycles should be used according to the washer and detergent manufacturer's recommendations.

6. Decontamination and laundering of protective clothing

Protective work clothing contaminated with blood or other body fluids to which universal precautions apply should be placed and transported in bags or containers that prevent leakage. Personnel involved in the bagging, transport, and laundering of contaminated clothing should wear gloves. Protective clothing and station and work uniforms should be washed and dried according to the manufacturer's instructions. Boots and leather goods may be brush-scrubbed with soap and hot water to remove contamination.

7. Infective waste

The selection of procedures for disposal of infective waste is determined by the relative risk of disease transmission and application of local regulations, which vary widely. **In all cases, local regulations should be consulted prior to disposal procedures, and followed.** Infective waste, in general, should either be incinerated or should be decontaminated before disposal in a sanitary landfill. Bulk blood, suctioned fluids, excretions, and secretions may be carefully poured down a drain connected to a sanitary sewer, where permitted. Sanitary sewers may also be used to dispose of other infectious wastes capable of being ground and flushed into the sewer, where permitted. Sharp items should be placed in puncture-proof containers and

other blood-contaminated items should be placed in leak-proof plastic bags for transport to an appropriate disposal location.

Prior to the removal of protective equipment, personnel remaining on the scene after the patient has been cared for should carefully search and remove contaminated materials. Debris should be disposed of as noted above.

1.4 Medical Requirements

1.4.1 HBV Vaccination

All workers whose jobs involve participation in tasks or activities with exposure to blood or other body fluids to which universal precautions apply (as defined above) should be vaccinated with HBV vaccine.

1.4.2 Post-Exposure Management

Once an exposure has occurred, a blood sample should be drawn after consent is obtained from the individual from whom exposure occurred and tested for hepatitis B surface antigen (HBsAg) and antibody to HIV. Local laws regarding consent for testing source individuals should be followed. Policies should be available for testing source individuals in situations where consent cannot be obtained (e.g., and unconscious patient). Testing of the source individual should be done at a location where appropriate pre-test counseling is available; post-test counseling and referral for treatment should be provided. It is extremely important that all individuals who seek consultation for any HIV-related concerns received counseling as outlined in the *Public Health Service Guidelines for Counseling and Antibody Testing to Prevent HIV Infection and AIDs*.

- **HBV Post-Exposure Management:** For an exposure to a source individual found to be positive for HBV or HBsAg, the worker who has not previously been given hepatitis B vaccine should receive the vaccine series. A single dose of hepatitis B immune globulin (HBIG) is also recommended, if this can be given within seven days of exposure. For exposures from an HBV-positive source to workers who have previously received the vaccine, the exposed worker should be tested for antibody to hepatitis B surface antigen (anti-HBs) and given one dose of vaccine and one dose of HBIG if the antibody level in the worker's blood sample is inadequate.

If the source individual is negative for HBV/HBsAg and the worker has not been vaccinated, this opportunity should be taken to provide hepatitis B vaccination.

If the source individual refuses testing or he/she cannot be identified, the unvaccinated worker should receive the hepatitis B vaccine series. HBIG administration should be considered on an individual basis when the source individual is known or suspected to be at high risk of HBV infection. Management and treatment, if any, of previously vaccinated workers who receive an exposure from a source who refuses testing or is not identifiable should be treated on a case-by-case basis.

- **HIV Post-Exposure Management:** For any exposure to a source individual who has AIDS, who is found to be positive for HIV infection, or who refuses testing, the worker should be counseled regarding the risk of infection and evaluated clinically and serologically for evidence of HIV infection as soon as possible after the exposure. In view of the evolving nature of HIV post-exposure management, the health-care provider should be well-informed

of current U.S. Public Health Service (PHS) guidelines on this subject. The worker should be advised to report and seek medical evaluation for any acute febrile illness that occurs within 12 weeks after the exposure. Such an illness, particularly one characterized by fever, rash, or lymphadenopathy, may be indicative of recent HIV infection. Following the initial test at the time of exposure, seronegative workers should be retested six weeks, 12 weeks, and six months after exposure to determine whether transmission has occurred. During this follow-up period (especially the first six to 12 weeks after exposure, when most infected persons are expected to seroconvert), exposed workers should follow PHS recommendations for preventing transmission of HIV. These include refraining from blood donation and using appropriate protection during sexual intercourse. During all phases of follow-up, it is vital that worker confidentiality be protected.

If the source individual was tested and found to be seronegative, baseline testing of the exposed worker with follow-up testing 12 weeks later may be performed if desired by the worker or recommended by a health-care provider.

If the source individual cannot be identified, decisions regarding appropriate follow-up should be made on a case-by-case basis. Serologic testing should be made available by the employer to all workers who may be concerned that they have been infected with HIV through an occupational exposure as defined above.

1.4.2 Post-Exposure Procedures and Evaluation

Subsequent to all reported exposure incidents, a confidential medical evaluation and follow-up shall be made available to each employee exposed in the incidents.

1.4.2.1 Documentation Procedures

Documentation of the exposure incident shall be recorded as soon as possible, and include the route(s) of exposure, the circumstances surrounding the incident, and the identification of the source individual. Additionally, each incident involving voluntary first aid providers shall be placed on the "first aid incident list" attached to the location OSHA Log of Occupational Injuries and Illnesses.

1.4.2.2 Blood Testing

Based upon the known and anticipated site contaminants, blood testing is not required for this project.

1.4.2.2.1 Source Individuals

As soon as feasible, the source individual in an exposure incident will be asked to consent to a blood test to determine HBV and HIV infectivity. Where applicable laws require employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All results should be kept confidential, as criminal and civil penalties may be charged against persons negligently or willfully releasing such information, depending on local laws.

1.4.2.2.2 Exposed Employees

Exposed employees will be asked to consent to a blood test for HBV and HIV serological status. If consent to HIV testing is denied, the blood sample will be preserved for 90 days, within such time the employee may elect to consent to the HIV test.

1.4.3 Post-Exposure Medical Evaluations

Exposed employees shall receive a healthcare professional's written opinion for post-exposure evaluations. The written opinion shall include the results of the evaluation and any medical conditions resulting from the exposure incident which requires further medical treatment.

1.5 Hazard Communication

1.5.1 Warning Labels

Containers used for disposal of blood contaminated supplies and waste will be labeled in accordance with the word "biohazard."

1.5.2 Warning Signs

There are no designated areas for medical treatment on site, since first aid will be provided on an emergence basis only, and therefore warning signs are not applicable. In cases of potential exposure observers and non essential personnel should be verbally warned to keep a safe distance from injured personnel.

1.5.3 Employee Training Program - Voluntary Providers

All associates who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in this HASP, and the general provisions of Earth Tech's procedures.

1.5.4 Employee Training Program - Designated Providers

Employee training will be provided at the time of initial assignment and annually thereafter. Additional training will be given as changes in or modification to procedures occur.

The training program includes the following elements:

- A copy of 29 CFR 1910.1030 for review
- Explanations of epidemiology of bloodborne diseases, modes of transport, symptoms of infection
- Explanation of the exposure control plan, methods used to recognize tasks with potential exposure
- Explanations of use and limitations of control measures

- Information on the Hepatitis B vaccination, medical evaluation, post-exposure follow-up
- Explanation of warning signs and labels.

1.6 Recordkeeping

1.6.1 Training Records

All employees selected to attend the training program that covers the contents of this plan shall sign the Acknowledgment Form and the Training Attendance Form.

The training record will contain the date; training outline; name and qualifications of the trainer, and names and job titles of attendees.

At the completion of the training program, all participants must take and pass the training quiz.

The training records will be maintained by the Earth Tech Training Department for at least three years from the training date.

1.6.2 Medical Records

Medical records necessary for Earth Tech employees must include documentation on HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

1.6.2.1 Confidentiality

The employee medical records will be forwarded to EMR for inclusion in the employee's medical file.

1.6.2.2 Maintenance and Transfer of Records

Earth Tech shall maintain the employee medical records for the duration of the employee's employment plus 30 years thereafter.

If, for whatever reason, Earth Tech no longer does business and no successor exists, the will notify the Director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the Director of NIOSH.

1.6.3 Incident Recording

An incident the occurs as a result of rendering emergence medical care will be recorded on the OSHA 200 log as OSHA defines work-related injuries and illnesses.

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory civil penalties against employers of up to \$7,000 for each serious violation and for optional penalties of up to \$7,000 for each non-serious violation. Penalties of up to \$7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to \$70,000 for each such violation. A minimum penalty of \$5,000 may be imposed for each willful violation. A violation of posting requirements can bring a penalty of up to \$7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any employee, upon conviction, is punishable by a fine of up to \$250,000 (or \$500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of \$10,000 or up to six months in jail or both.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

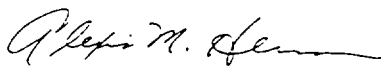
Under provisions of Title 29, Code of Federal Regulations, Part 1503.2(a)(1) employers must post this notice (or facs mime) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

| | |
|-------------------|----------------|
| Atlanta, GA | (404) 562-2300 |
| Boston, MA | (617) 565-9860 |
| Chicago, IL | (312) 353-2220 |
| Dallas, TX | (214) 767-4731 |
| Denver, CO | (303) 844-1600 |
| Kansas City, MO | (816) 426-5861 |
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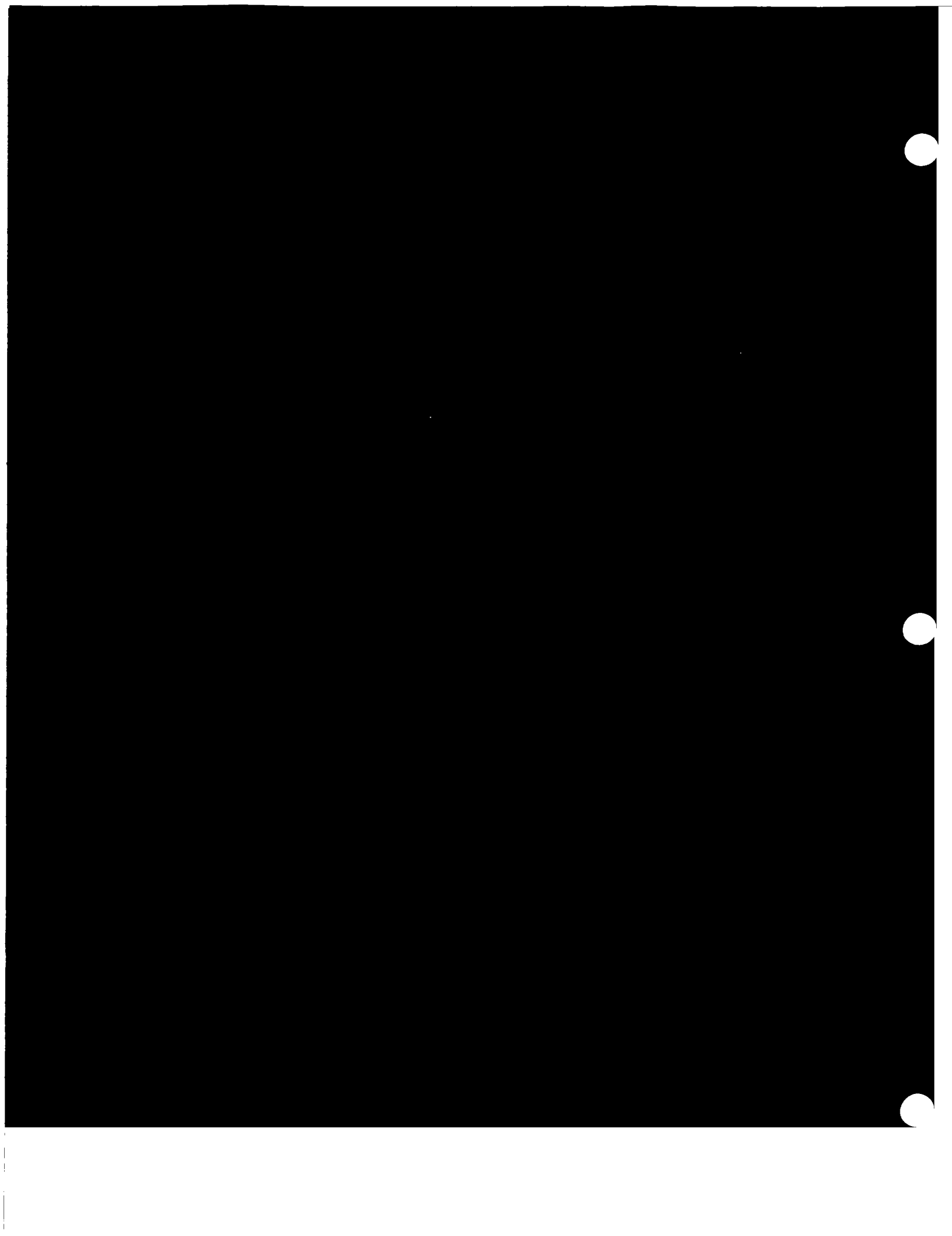
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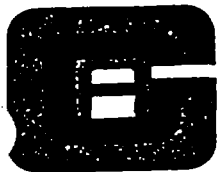
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MANAGEMENT

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COMPRESSED GAS ASSOCIATION, INC.

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November, 1998

Dear Holder of CGA P-22, *The Responsible Management & Disposition of Compressed Gases & Their Containers*, 1995 edition:

Enclosed is an Addendum for the CGA 1995 edition of P-22, *The Responsible Management & Disposition of Compressed Gases & Their Containers*, that you have previously purchased. The P-22 Addendum contains a new section entitled, "Disposition of Unserviceable Acetylene Cylinders." The Addendum was published 11/98 and will be included in the future revision of CGA P-22, *The Responsible Management and Disposition of Compressed Gases and Their Containers*.

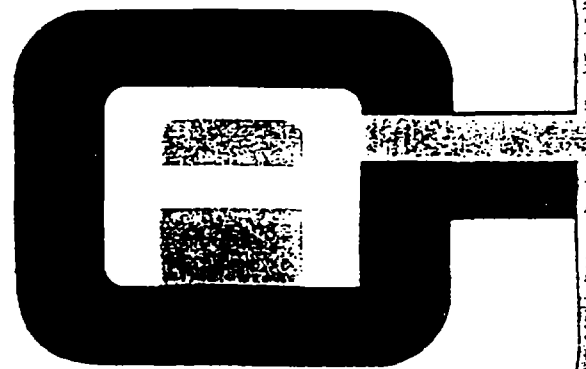
This addendum is provided by the Compressed Gas Association, Inc. in an ongoing effort to promote safety in the industrial gas industry.

Sincerely,

Environmental Committee

THE RESPONSIBLE
MANAGEMENT AND
DISPOSITION OF
COMPRESSED GASES
AND THEIR CONTAINERS

COMPRESSED GAS
ASSOCIATION, INC.



PLEASE NOTE:

The information contained in this document was obtained from sources believed to be reliable, and is based on technical information and experience currently available from members of the Compressed Gas Association, Inc. and others. However, the Association or its members, jointly or severally, make no guarantee of the results and assume no liability or responsibility in connection with the information or suggestions herein contained. Moreover, it should not be assumed that every acceptable commodity grade, test or safety procedure or method, precaution, equipment or device is contained within, or that abnormal or unusual circumstances may not warrant or suggest further requirements or additional procedure.

This document is subject to periodic review and users are cautioned to obtain the latest edition. Comments and suggestions are invited from all users for consideration by the Association in connection with such review; any such comments or suggestions will be fully reviewed by the Association after giving the party, upon request, a reasonable opportunity to be heard. (See proposed change sheet on last printed page of this document)

This document should not be confused with federal, state, provincial, or municipal specifications or regulations, insurance requirements or national safety codes. While the Association recommends reference to or use of this document by government agencies and others, this document is purely voluntary and not binding.

A catalog listing of all publications, audiovisual programs, safety and technical bulletins, and safety posters is available at no charge upon request from the Compressed Gas Association, Inc. Phone 703-412-0900, ext. 799, Fax 703-412-0128.

CONTENTS

Page

| | | |
|---|--|----|
| 1 | Introduction..... | 4 |
| 2 | Purpose and Scope..... | 4 |
| 3 | Definitions | 4 |
| 4 | Rights and Responsibilities..... | 6 |
| | 4.1 Customer..... | 6 |
| | 4.2 Supplier..... | 6 |
| | 4.3 Distributor..... | 7 |
| 5 | U.S. Regulatory Overview..... | 7 |
| | 5.1 Federal Regulations | 7 |
| | 5.2 State Requirements | 8 |
| | 5.3 Local Requirements | 8 |
| | 5.4 Canadian Regulations | 8 |
| 6 | Safety and Environmental Risks..... | 8 |
| 7 | Cylinder Management Practices | 9 |
| | 7.1 Preventing Problem Cylinders | 9 |
| | 7.2 Evaluation of a Cylinder and Its Contents | 9 |
| | 7.3 Handling of Problem Cylinders | 11 |
| | 7.4 Transportation..... | 12 |
| | 7.5 Disposition..... | 12 |
| | 7.6 Selection Criteria for Environmental Contractors and TSD Facilities..... | 14 |
| | 7.7 Emergency Response Plan Development | 15 |
| 8 | References | 16 |

THE RESPONSIBLE MANAGEMENT AND DISPOSITION OF COMPRESSED GASES AND THEIR CONTAINERS

1 Introduction

This publication is the latest of a series compiled by the Compressed Gas Association, Inc., in response to demand for information relating to the disposition of compressed gas cylinders and their contents.

2 Purpose and Scope

2.1 The purpose of this publication is to increase awareness of important safety and environmental issues regarding the proper handling, transportation and disposition of:

- (a) Cylinders containing unknown or potentially contaminated contents,
- (b) Cylinders of questionable integrity,
- (c) Cylinders destined for decommissioning,
- (d) Cylinder contents.

2.2 The information in this publication is intended for use by customers, shippers, carriers, distributors, safety and environmental administrators, and others desiring an introductory knowledge of the subject. Anyone requiring more detailed or specialized information should consult their compressed gas supplier.

2.3 Never attempt to handle, transport or dispose of problem cylinders or their contents without the assistance of specially trained experts. Improper handling may result in serious injury or death. Potential hazards include explosions or release of contents under pressure that may be toxic, poisonous, corrosive or highly reactive. If you find a problem cylinder, contact the supplier immediately.

3 Definitions

For the purposes of this document, the following terms are defined.

3.1 Abandoned Cylinder: A cylinder for which no owner of the cylinder or the cylinder's contents can be identified. An abandoned cylinder should be considered to have unknown contents regardless of identifying marks, labeling and valve configuration.

3.2 Analysis: A scientific procedure utilizing recognized analytical protocols to produce sufficient data that identify the compound or compounds that make up the sample.

3.3 Appurtenances: Devices such as pressure relief devices, valves, pressure gauges, regulators, etc. that may be attached to a cylinder.

3.4 Container: Compressed gas cylinder (see "cylinder" definition).

3.5 Contamination: The introduction of a foreign (unwanted) material into a cylinder. Contamination can occur during filling or through external connection with other cylinders, process equipment (backflow) or the atmosphere.

3.6 Customer: A business or individual that purchases industrial, medical or specialty gases in cylinders.

3.7 Cylinder: A portable pressure vessel designed for pressures higher than 40 psia (2.8 bar), having a water capacity of 1000 pounds (454 kg) or less, having a circular cross section and manufactured in accordance with recognized national standards. For purposes of this document, use of the term "cylinder" shall be taken to include not only the pressure vessel, but its appurtenances as well.

3.8 Cylinder Containment Vessel: A sealed container suitable for holding a problem cylinder for the purpose of safely containing and transporting that cylinder and its contents. Vessels for this purpose must be rated for a sufficiently high internal pressure appropriate to the characteristics of the gaseous contents to be

transported, and must be in accordance with all applicable U.S. DOT regulations and ASME standards.

3.9 Decommission: The removal of a compressed gas container from service by rendering it permanently unusable.

3.10 Disposable Cylinder (Non-Refillable): Term sometimes used to describe "non-refillable" cylinders (see Non-Refillable definition).

3.11 Disposal: The deposit in a landfill or introduction into the environment (i.e., venting of cylinder contents to atmosphere) in accordance with federal, state and local regulations.

3.12 Disposition: The recycling, treatment or disposal of a compressed gas cylinder and/or its contents.

3.13 Distributor: A business engaged in the sale and/or resale of compressed and liquefied gases.

3.14 Environmental Contractor: A firm or individual qualified to provide services associated with one or more of the following services: sampling, analysis, handling, transportation, treatment, storage, recycling and disposal of hazardous materials. This definition also includes contractors which investigate, prevent, control and remediate hazardous material releases.

3.15 Known Cylinder: A cylinder properly labeled together with available knowledge regarding purchase, use, handling, storage and maintenance or a cylinder whose contents have been verified by analysis.

3.16 Manufacturer: See definition of Supplier.

3.17 Non-Refillable (Disposable): Non-reusable cylinders manufactured to Department of Transportation (DOT) [1]¹, Interstate Commerce Commission (ICC) [2], Canadian Transport Commission (CTC) and Transport Canada (TC)

specifications: 39, 39M, 40 and 41 [3]. These cylinders shall not be refilled or reused for any purpose.

3.18 Problem Cylinder: A cylinder that is not usable in the normal course of business, including but not limited to:

- (a) Abandoned cylinders;
- (b) Cylinders with unknown contents;
- (c) Cylinders that are not in condition to be safely transported;
- (d) Cylinders with inoperable valves;
- (e) Cylinders with unstable contents (i.e., shock sensitive, overpressurized, etc.)

3.19 Recovery: The collecting of materials prior to recycling or other use.

3.20 Recycle: Reuse of a recovered material as a product or in an industrial process to make a product. This does not include the reuse of the material for energy recovery.

3.21 Supplier: A business that produces, fills and/or distributes compressed gases and compressed gas cylinders.

3.22 Treatment: A process, including neutralization, designed to change the physical, chemical or biological character or composition of a material. Energy recovery, volume reduction, absorption, adsorption and toxicity reduction are considered treatment.

3.23 Unknown Cylinder: A cylinder that fits one or more of the following criteria:

- (a) Does not contain a label or it is suspected that the label has been altered or tampered with;
- (b) A cylinder whose valve and relief device configuration does not correspond to its label according to industry standards;

¹ NOTE: References in this document are shown by bracketed numbers and are listed in the order of appearance.

(c) A cylinder whose contents may have been contaminated, such as through improper connection with other cylinders, process equipment or the atmosphere;

(d) A cylinder that is suspected of being used for something other than its intended service since the last fill.

4 Rights and responsibilities

The supplier and the customer are mutually responsible for educating employees using these products to ensure that human life, property and the environment are protected in all aspects associated with the handling and disposition of cylinders and their contents. Each party has rights and responsibilities in this partnership that should be known and understood.

4.1 Customer

4.1.1 Customer rights

The customer has the right to receive cylinders in good condition. Cylinders shall comply with all applicable safety, environmental, transportation and other laws and regulations. There shall be no damage or obvious flaws that could compromise the integrity of the cylinder.

The customer has the right to receive safety and environmental information about the compressed gases it purchases. This information is generally included in Material Safety Data Sheets (MSDSs).

The customer has the right to receive the product at a time and place mutually agreed upon so that adequate control and custody of the cylinder(s) and contents are appropriately transferred.

4.1.2 Customer responsibilities

The customer is responsible for maintaining the integrity of cylinder contents. Precautions shall be taken to prevent contamination of the cylinder by substances that may be present in customer processes. Such precautions include the use of check valves or other backflow prevention devices.

The cylinder shall not be used for other than its intended purpose. It shall not be used to contain substances other than those placed in it by the supplier. Both DOT and Transport Canada regulations prohibit the filling of a cylinder without the consent of the owner. The customer is responsible for compliance with DOT/TC regulations for any cylinder it ships.

The customer must maintain the integrity of the cylinder. Precautions shall be taken to prevent damage to the cylinder, its markings or its appurtenances. Cylinders shall be appropriately secured to prevent them from falling over. They shall be protected from impact, excessive heat or cold, and other adverse environmental conditions.

The customer has a responsibility to its employees and the general public to abide by all applicable safety and environmental laws, regulations and guidelines. The customer shall ensure that its employees are properly trained.

The customer should develop and maintain adequate procedures to provide reliable information about the current use and location of all cylinders while in the customer's possession.

The customer retains responsibility for all cylinders owned by the customer from initial receipt to final disposition ("cradle-to-grave"), including those times when the cylinder is not in the customer's actual custody. No known problem cylinder shall be sent to anyone without their knowledge of its condition.

The customer should notify the supplier of any problem identified with leased cylinders in its custody. The customer should contact the supplier for technical information related to customer-owned cylinders.

4.2 Supplier

4.2.1 Supplier rights

The supplier has the right to refuse acceptance of customer-owned cylinders for disposition.

The supplier has the right to refuse acceptance of a cylinder believed to contain an unknown or contaminated substance. The supplier has the right to refuse acceptance of any cylinder not owned by the supplier.

The supplier has the right to refuse to transport any cylinder that is not in transportable condition as defined by DOT, TC, or any applicable state, provincial or local regulations.

4.2.2 Supplier responsibilities

The supplier has a responsibility to deliver cylinders in good condition. Cylinders shall comply with all applicable laws and regulations. There shall be no damage or obvious flaw that could compromise the integrity of the cylinder.

The supplier is responsible for providing safety and environmental information about the compressed gases it supplies. This information is generally provided by Material Safety Data Sheets (MSDSs).

The supplier has a responsibility to its employees and the general public to abide by all applicable safety and environmental laws, regulations and guidelines. The supplier shall ensure that its employees are properly trained.

The supplier has a responsibility to provide the product at a time and place mutually agreed upon so that adequate control and custody of the cylinder(s) and contents are appropriately transferred.

4.3 Distributor rights and responsibilities

The distributor takes part in two safety and environmental management partnerships. It plays the role of the customer in a partnership with its supplier and the role of the supplier in a partnership with its customers. The distributor enjoys the rights and bears the responsibilities of its role in each of these two partnerships.

In order to adequately fulfill its responsibilities in both partnerships, the distributor should provide an open channel for communication between its

suppliers and its customers. Any safety and environmental information or guidelines provided by its supplier shall be passed on to its customers. Any information about problems identified by its customer related to cylinders or cylinder contents should be passed on to its supplier.

5 U.S. Regulatory overview

5.1 Federal regulations

Numerous federal, state, and local regulatory requirements can impact the handling and disposition of compressed gases and their containers. The U.S. Environmental Protection Agency (EPA), the federal Occupational Safety and Health Administration (OSHA), and the U.S. Department of Transportation (DOT) are the principal federal agencies which have regulations that affect the handling, storage, transportation and disposition of these items. State and local agencies may enforce the federal regulations. In many cases, states have developed standards and regulations which are more stringent than the federal agencies. For more detail, review specific requirements under Title 40 (EPA) [4], Title 29 (OSHA) [5], and Title 49 (DOT) of the Code of Federal Regulations [1], in addition to state and local requirements.

5.1.1 U.S. Environmental Protection Agency (EPA)

Some of the primary regulations that apply to the handling and disposition of compressed gases and their containers are promulgated by the EPA pursuant to the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA, commonly referred to as Superfund), and the Emergency Planning and Community Right-to-Know Act (EPCRA). These regulations are found in Title 40 of the Code of Federal Regulations. [4]

RCRA establishes "cradle-to-grave" responsibility for the proper handling, transportation, treatment, and disposal of hazardous waste. The EPA has established that

cylinders that are returned to a supplier for refilling or reuse are exempt from RCRA (hazardous waste) requirements. Cylinders designed to be non-refillable may or may not be exempted from RCRA requirements depending on their specific contents.

Some materials are assigned a reportable quantity (RQ) value by EPA for release reporting. If these materials are released to the environment within a 24-hour period in amounts equal to or greater than the RQ value, the release must be reported to the Local Emergency Planning Committee, the State Emergency Response Commission, and the National Response Center. The RQ value of the material is usually listed on the Material Safety Data Sheet (MSDS) provided by the supplier.

Under CERCLA, parties involved with the generation, transportation, treatment, or disposal of a hazardous substance that causes "a release to the environment" or a "threatened release to the environment" may become liable for that release. Since "hazardous substance" and "release to the environment" are broadly defined, the customer, distributor and supplier of the product should be aware of potential Superfund liability.

5.1.2 Occupational Safety and Health Administration (OSHA)

OSHA has a number of regulations that impact the handling of compressed gas cylinders and their contents in the workplace. These regulations are found in Title 29 of the Code of Federal Regulations [5]. The regulations require the availability of MSDSs and a hazard communication (right-to-know) program for employees. They include specific requirements pertaining to emergency response and availability of personal protective equipment, among others. These regulations contain requirements for minimum training in emergency response and the proper handling and use of hazardous materials.

5.1.3 U.S. Department of Transportation (DOT)

DOT regulations principally address employee training, container markings, documentation (e.g. manifests, labels) and container design related to the transportation of hazardous materials. These regulations are found in Title 49 of the Code of Federal Regulations [1]. Containers shall be designed, labeled, and maintained in a condition that meets DOT requirements. All hazardous materials shall be packaged, marked and labeled in accordance with DOT requirements. Hazardous material releases during transit must be reported in accordance with DOT, state or local regulations.

5.2 State requirements

States regulations must be at least as stringent as the federal requirements associated with handling and disposition of compressed gas cylinders. A number of states have established requirements which are more stringent than the federal requirements. Contact state regulatory agencies concerning state requirements.

5.3 Local requirements

Local governments and agencies may establish more stringent requirements than state or federal agencies. Contact local regulatory agencies concerning local requirements.

5.4 Canadian Regulations

Canadian regulations generally mirror the U.S. regulatory requirements. Contact your supplier or the appropriate federal, state, provincial or local authorities for more detailed information.

6 Safety and environmental risks

There are substantial safety and environmental risks associated with the improper handling and disposition of compressed gases and their containers. Hazards can include, but are not limited to:

- (a) gases under pressure:

- (b) flammable gases;
- (c) explosive mixtures;
- (d) poisonous or toxic materials;
- (e) corrosive, oxidizing, or reactive materials.

Improper handling could result in injury or death and damage to property or the surrounding environment. Substantial regulatory penalties, civil liability and/or criminal prosecution may result. Employee, community, and public relations can be severely damaged as a result of an incident.

7 Cylinder Management Practices

7.1 Preventing Problem Cylinders

The utilization of good cylinder management practices can prevent a known cylinder from becoming a problem cylinder. In addition to safe storage, use and handling procedures, the establishment of ownership, knowledge of each cylinder's usage, and employee training are important.

7.1.1 Establishment of ownership

Ownership of a cylinder shall be established prior to the decommissioning of that cylinder. Each cylinder owner should be prepared to produce evidence of ownership for each owned cylinder. Original invoices or other similar documentation that indicates serial numbers may be considered adequate evidence of ownership. Such documentation ensures that cylinders that are moved between departments, used in the distribution of compressed gas products, or eventually misplaced can be easily traced to their current owners. Where ownership of a cylinder and its contents cannot be established by a good faith effort, the cylinder and its contents shall be considered abandoned.

7.1.2 Cylinder usage knowledge

Knowledge of past and current uses of a cylinder is helpful in ascertaining or confirming the integrity and current contents of a cylinder. The supplier, distributor and customer should each develop and maintain sufficient procedures to provide reliable information about the current use and location of cylinders in their possession.

7.1.3 Employee training

To ensure that cylinders are stored, used, handled and tracked properly, sufficient training should be provided to employees performing these functions. Such training should be appropriate to the job task and should include, but may not be limited to:

- (a) Product safety information;
- (b) Safe storage, handling and use procedures;
- (c) Cylinder integrity assessment procedures;
- (d) Sufficient process operation training (e.g., filling procedures) to prevent contamination of cylinder contents;
- (e) Awareness training on the potential hazards associated with damaged, mishandled or contaminated cylinders;
- (f) Documentation procedures;
- (g) Emergency response procedures.

It is the responsibility of each employer to ensure that their employees are adequately trained to effectively and safely perform their duties.

7.2 Evaluation of a cylinder and its contents

The key to responsible management of problem cylinders is proper assessment of cylinder integrity and content identification. *Content assessment procedures should be performed only by specially*

trained experts. Improper procedures may result in serious injury or death. Potential hazards include explosions or release of contents under pressure that may be toxic, poisonous, corrosive or highly reactive.

7.2.1 Cylinder integrity determination

Prior to handling, sampling or shipping a cylinder, an inspection of the cylinder should be performed. The inspector should be appropriately trained and qualified for the task. Guidelines for conducting visual inspections are found in the following CGA publications:

- (a) CGA C-6, *Standards for Visual Inspection of Steel Compressed Gas Cylinders* [6];
- (b) CGA C-6.1, *Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders* [7];
- (c) CGA C-6.2, *Guidelines for Visual Inspection and Requalification of Composite High Pressure Cylinders* [8];
- (d) CGA C-6.3, *Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders* [9];
- (e) CGA C-13, *Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders* [10]

7.2.2 Cylinder contents identification

Accurate identification of cylinder contents is crucial. Content determination may be obtained through knowledge of cylinder origin and usage combined with proper labeling and valve configurations. Cylinders with unknown contents require analysis for determination of contents.

In determining contents of a cylinder, reliance should not be placed solely on external characteristics. The cylinder and valve type, labeling or other characteristics should be

supported by knowledge of the cylinder's origin, age, use and potential for contamination. Cylinder contents should never be determined only by the color of the cylinder.

7.2.3 Sampling and analysis

Sampling and analysis provides the most reliable information for proper management of problem cylinders and their contents. Any inconsistency, question or lack of knowledge about the cylinder is cause for requiring positive identification through sampling and analysis. These operations should be conducted by properly trained personnel.

Equipment used for sampling cylinder contents should be rated for the maximum pressure which could be in the cylinder with a suitable safety factor applied for potentially over-pressurized containers. All components of the system should be cleaned and suitable for oxygen service as a minimum. Passivation (the rendering of a surface less reactive to strong oxidizers) of the system may be required for stronger oxidizers (e.g., fluorine compounds).

Handling of the cylinder during sampling should be minimized. The exterior of the cylinder should be carefully examined for evidence of damage, corrosion, or contamination. Severely corroded cylinders should be handled with due consideration of the possibility for cylinder or valve failure during sampling operations. Grease, oil, tar or any other foreign matter shall be removed from a cylinder valve prior to sampling.

Contingency plans to be used in responding to a potential emergency should be prepared prior to any sampling activity. Appropriate personal protective equipment (PPE) should be used by sampling personnel. Coordination with local response agencies is recommended.

The sampling procedure should provide a means for determining cylinder pressure. Care must be taken where no pressure indication is observed. This may indicate:

(a) Liquid contents at low pressure. Laboratory analysis of a vapor phase sample may not indicate actual cylinder contents. Both the liquid and vapor phases should be sampled;

(b) Inoperable cylinder valve. Never assume a cylinder is empty based solely on a lack of pressure.

Cylinders with inoperable or blocked valves represent a particularly hazardous sampling challenge. Specially trained, qualified and properly equipped personnel are necessary to address the problems associated with sampling these cylinders.

If samples are sent to an off-site laboratory, the sample container must meet all applicable DOT/TC regulations for the contained material. Chain-of-custody documentation should accompany the sample. This documentation should provide a history of the handling of the sample from its origin to analysis and disposition. Procedures used for analysis of gases should be performed using proper laboratory techniques and quality assurance/quality control procedures.

7.3 Handling of problem cylinders

Specific procedures addressing safety and environmental risks should be developed for the particular circumstances in handling a problem cylinder. *Never attempt to handle, transport or dispose of problem cylinders or their contents without the assistance of specially trained experts.*

"General guidelines" published in this and other CGA documents should be considered as the minimum acceptable procedures when dealing with problem cylinders. When dealing with the special risks associated with problem cylinders, additional procedures and precautions may be necessary.

7.3.1 Cylinders with unknown contents

Cylinders with unknown contents, including abandoned cylinders, should be handled assuming a worst-case scenario (as if the contents are shock-sensitive, explosive, poisonous, strong oxidizers and/or an incompatible mixture). Specific and verifiable knowledge of the contents of the cylinders should be considered in developing the handling procedures.

See also section 7.3.5, "Special Situations".

7.3.2 Cylinders unsafe for transportation

Some cylinders may not be suitable for transportation due to poor condition or prohibited contents. The condition of the cylinder and valve shall be such that there is no increased risk of leak or failure during transportation and handling. If the specific contents of a cylinder are prohibited under DOT (see 49 CFR 172.101) or TC regulations, they shall not be shipped.

Some cylinders in deteriorated condition may be transported in DOT-authorized cylinder containment vessels.

The contents of a cylinder unsafe for transportation, if known, may be transferred to a DOT or TC authorized containment vessel for transportation. Transfer of contents shall be performed by properly trained and qualified personnel. In addition, provisions should be made for the possibility of valve failure (failure to operate or leakage).

See also section 7.3.5, "Special Situations".

7.3.3 Cylinders with contaminated contents

If the contents of a cylinder have been contaminated or are suspected of being contaminated, analysis of the contents should be conducted prior to establishing the handling procedures and disposition. Mixtures containing components that are incompatible with one another or their container are prohibited from being shipped under DOT [see 49 CFR 173.301(a)] and

TC regulations. Potentially reactive or explosive mixtures should only be handled by specially trained and experienced personnel.

7.3.4 Special situations

Some cylinders have contents that change their chemical characteristics over time (decompose, polymerize, etc.). These changes may eventually result in over-pressurization that exceeds the specification of the cylinder. This situation renders the cylinder unsafe for transport. Examples of contents that may result in this type of situation under certain circumstances include 1,3-Butadiene, Hydrogen Bromide and Diborane. Contents of cylinders that have become contaminated with a foreign material may also result in a chemical reaction resulting in over-pressurization or an explosive hazard. These cylinders should be handled with extreme care and only by specially trained and qualified personnel.

7.4 Transportation

Cylinders for which inspections reveal evidence of severe corrosion or pitting, or bulging or fire damage (see section 7.2.1) shall not be offered for transportation unless the cylinder is properly prepared to provide for the containment of the substance in the event of a leak or total release of contents. Such secondary containment is not provided through the use of salvage drums, but through using DOT/TC-authorized cylinder containment vessels. Cylinders containing unknown contents cannot be legally shipped in a cylinder containment vessel. Potentially reactive or explosive mixtures should only be handled by specially trained and experienced personnel.

The transportation of problem cylinders also demands that the owner, contractor or customer ensures that each cylinder is inspected and evaluated prior to its transportation. The basis for cylinder inspections is covered in section 7.2.1 of this publication and is designed to ensure that the vessel is safe for transportation.

Transporters of cylinders should demonstrate that they are experienced in cylinder movement and

have the requisite equipment required to properly handle the cylinders during transit. The transporter should also provide adequate insurance and permits for hazardous materials/hazardous waste transportation and should also provide evidence of training as may be required under 49 CFR, Transport Canada and other safety and environmental regulations[1] [3].

7.5 Disposition

7.5.1 Recovery and recycle

Recovery and recycling of materials are preferred over other methods of disposition. An effort should be made to recover and recycle the contents of a cylinder.

Some companies may accept customer-owned cylinders of known contents for recycling. The recycler should take precautions to ensure that cylinder integrity and content identification are confirmed. The recycler is potentially responsible for the resolution of any problem cylinders in its custody. The customer is responsible for cylinder integrity and content identification for any cylinder offered for recycle (see section 4.1).

7.5.2 Treatment

On-site and off-site treatment may be conducted as disposition actions.

On-site treatment refers to the management of cylinder contents through a treatment process that does not necessitate transportation of the cylinder off-site.

On-site treatment is often used in the following situations:

- (a) There are no off-site options:
- (b) The cylinder is in a non-DOT/TC transportable condition and cannot be moved from the site or transferred into another container:

(c) The cylinder is leaking and must be treated immediately;

(d) Regulatory agencies mandate on-site treatment.

Off-site treatment refers to the shipment of the material to an off-site facility for treatment.

On-site and off-site treatment requires a state or federal EPA treatment permit unless exempted from permit requirements, and may require coordination with local officials (i.e., fire department) and the development and implementation of a Health & Safety Plan. Other environmental permits (i.e., air permits) are also often required. Other regulations may apply. For more information about treatment, storage and disposal facilities (TSD Facilities) as defined by RCRA, see 7.6.3.

7.5.3 Cylinder content disposition

7.5.3.1 Poisonous, toxic or ozone depleting products

Before proceeding with the disposition of cylinder contents, the label should be read to determine if the cylinder contents are poisonous or an ozone-depleting substance. These substances require special care and handling. If the contents of a cylinder are unknown, or are not identified in a manner that will allow one to be absolutely certain that they are non-poisonous or not an ozone-depleting substance, these contents shall be treated as a toxic substance. Under no circumstances should the contents of these cylinders be vented to the atmosphere. The supplier should be contacted to identify the proper disposal procedure for these cylinders. See section 7.3.

It is recommended that the actual disposal procedure be performed only by knowledgeable persons familiar with all applicable federal, state, provincial and local laws and regulations.

7.5.3.2 Non-toxic flammable and non-toxic non-flammable products

Non-toxic, non-flammable products may be safely vented to reduce the cylinder pressure to atmospheric pressure prior to recycling. Non-toxic flammable products should be fully expended through normal use before disposal. Unused flammable substances may be considered hazardous wastes under the U.S. Resource Conservation and Recovery Act (RCRA). The supplier should be contacted to obtain the proper procedure for rendering the cylinder recyclable. It is recommended that the actual disposal procedure be performed only by knowledgeable persons familiar with all applicable federal, state and local laws and regulations.

7.5.4 Cylinder decommissioning

Cylinder decommissioning should be performed on cylinders that are being permanently taken out of service (see special precautions related to acetylene cylinders, section 7.5.4.1, below).

Prior to decommissioning, cylinder contents shall be verified, removed from the cylinder and the cylinder purged with an inert gas. The decommissioning process should destroy the cylinder, rendering it unusable. No liquid or solid residues should be present. All materials that may have been absorbed into, or deposited onto the walls of the cylinder should be removed prior to disposition of the cylinder if they present a health or environmental hazard.

It is recommended that all identifying marks be removed from the cylinder after the appropriate decontamination procedures have been performed, but prior to ultimate disposition.

At a minimum, it is recommended that the following actions be taken for cylinders in non-inert gas service:

- (a) Remove cylinder contents and purge the cylinder with an inert gas:

(b). Additional decontamination procedures are necessary for cylinders in certain gas services (e.g., ethylene oxide, arsine, diborane, hydrogen selenide, cyanogen chloride, amines, hydrogen sulfide, methyl mercaptan, etc.). These include, but are not limited to, steam cleaning (with or without additives, e.g., detergents or caustics), water wash, caustic wash and various pretreatments to gradually deactivate certain highly reactive residues. **CAUTION:** *These processes may generate hazardous concentrations of toxic gases or liquids.* Appropriate engineering controls to protect personnel and the environment must be employed. Wastes generated from these processes may be hazardous and, therefore, need to be managed in accordance with appropriate federal, state, provincial and local environmental regulations:

(c) An elongated hole may be burned into the side of the cylinder. Other methods employed to render cylinders unusable include cutting the cylinder in half and crushing, among others:

(d) Cylinder markings should be removed.

Once the cylinder is decommissioned, it is acceptable for recycling as scrap metal.

7.5.4.1 Acetylene Cylinder Precautions

Acetylene cylinder decommissioning should be performed on cylinders that are being permanently taken out of service. Because of the unique construction and operation of acetylene cylinders (ref. CGA C-13 [10], CGA G-1, *Acetylene* [11], CGA G1.1, *Commodity Specification for Acetylene* [12]), the possible presence of asbestos and a solvent such as acetone or dimethylformamide (DMF) must be considered in any plans for cylinder disposal. Any acetylene cylinder disposal activities must be in accordance with federal, state, provincial and local environmental regulations.

7.5.5 Management of non-refillable (disposable) cylinders

Non-refillable cylinders manufactured to DOT Specification 39, 40 and 41, CTC Specification 39 and TC Specification 39M are non-refillable containers. These cylinders serve a wide variety of commercial and consumer uses. Proper disposition of non-refillable cylinders shall be conducted at the completion of their use. Once the initial contents filled by the supplier have been emptied, the cylinder is not to be refilled under any circumstances. Care must be practiced to assure proper and safe handling. Some non-refillable cylinders and their contents may require special handling and/or treatment prior to disposal.

Most non-refillable cylinders are constructed of steel or aluminum and contain products that are non-toxic. Most of these metal non-reusable cylinders may be recycled after the cylinder pressure is reduced to atmospheric pressure. For disposition options, contact your supplier. (See section 7.3.)

7.6 Selection criteria for environmental contractors, transporters, and treatment, storage, and disposal facilities (TSD Facilities)

An environmental contractor should be consulted when the customer or supplier does not have the expertise or equipment to manage a situation associated with hazardous materials. When the contents of a container or the container itself are designated a hazardous waste, either on-site treatment or off-site disposal may be used. All hazardous waste transporters and TSD Facilities must be properly permitted by the appropriate federal, state, provincial and/or local regulatory agencies.

7.6.1 Environmental contractors

Environmental contractors are typically used to prevent, control, investigate and/or remediate hazardous material incidents. The environmental contractor should demonstrate experience and expertise in the work that is to be performed. The

environmental contractor should have sufficient liability insurance in the proper form to protect your company and personnel as well as its own. One of the best ways to determine the competence of an environmental contractor is to contact its current and previous clients in addition to reviewing references provided by the contractor.

7.6.2 Transporters and waste brokers

Transporters provide transportation services to generators of hazardous waste. The transporter can be associated with the TSD Facility or be a separate company. Hazardous waste transportation companies must have an EPA identification number to accept hazardous waste. In Canada, hazardous waste transportation companies must be licensed by federal authorities. Extreme care should be taken when selecting a waste transporter since the waste generator has "cradle to grave" responsibility (see Section 7.6.3). Previous and existing clients should be contacted and insurance coverage evaluated. An audit of the transporter should be conducted. See section 7.6.3 for more information on selecting contractors (TSD Facilities).

Waste brokers generally provide services related to hazardous waste characterization, documentation and labeling, waste pick-up coordination, transportation, and TSD Facility identification. The same selection process used for transporters and TSD Facilities should be used for waste brokers due to "cradle to grave" liability.

7.6.3 Treatment, storage, and disposal facilities (TSD Facilities)

TSD Facilities provide hazardous waste treatment, storage and disposal services. To accept hazardous waste, the TSD Facility must have a hazardous waste (RCRA) permit. Under RCRA, the generator of hazardous wastes remains responsible for those wastes until they are ultimately destroyed. This is referred to as "cradle to grave" responsibility. In Canada, a TSD facility must be licensed by provincial authorities and similar "cradle-to-grave" responsibilities exist. Extreme care should be taken when selecting a

TSD Facility. A number of organizations (e.g. federal and state agencies, associations, and environmental consultants) provide information regarding TSD Facilities and should be contacted prior to selection. As with any environmental contractor, previous and existing clients should be contacted and insurance coverage should be evaluated. An audit of the TSD Facility should be conducted that considers its overall management, current and past client base, financial condition, housekeeping practices, regulatory compliance and compliance history, and record keeping.

7.7 Emergency response plan development

Each location which manufactures, uses, handles, or stores compressed gases should have an Emergency Response plan. This plan, at a minimum, should include:

- (a) The identification of site emergency coordinator(s);
- (b) A site plot plan;
- (c) Locations of types and amounts of hazardous materials;
- (d) Types and locations of emergency response equipment;
- (e) Evacuation routes and assembly areas; agencies and internal and external notification procedures;
- (g) Identity of emergency response personnel (if applicable).

Transporters of compressed gases should include communication and response procedures for transportation-related incidents in their plans.

Only properly trained and qualified individuals should respond to a release or potential release of a liquefied or compressed gas. This training must meet OSHA 29 CFR 1910.120(q) Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements and must include training in the proper techniques to respond to the

materials involved and the use of personal protective equipment.

8 References

[1] *Code of Federal Regulations*, Title 49 CFR Parts 100-199 (Transportation), U.S. Department of Transportation, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[2] U.S. Interstate Commerce Commission, Washington, D.C.

[3] *Transportation of Dangerous Goods Regulations*, Supply and Service Canada, Canadian Publication Centre, Ottawa, Ontario K1A 0S9.

[4] *Code of Federal Regulations*, Title 40 CFR (Environmental Protection), U.S. Environmental Protection Agency, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[5] *Code of Federal Regulations*, Title 29 CFR (Occupational Safety and Health), U.S. Occupational Safety and Health Administration, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[6] CGA C-6, *Standards for Visual Inspection of Steel Compressed Gas Cylinders*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[7] CGA C-6.1, *Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[8] CGA C-6.2, *Guidelines for Visual Inspection and Requalification of Composite High Pressure Cylinders*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[9] CGA C-6.3, *Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[10] CGA C-13, *Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[11] CGA G-1, *Acetylene*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

[12] CGA G1.1, *Commodity Specification for Acetylene*, Compressed Gas Association, Inc., 1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102.

CGA P-22—1995, Addenda

Disposition of Unserviceable Acetylene Cylinders*

*Published 11/98. To be included in the future revision of CGA P-22, *The Responsible Management and Disposition of Compressed Gases and Their Containers*.

1 Introduction. Cylinders marked ICC-8, DOT-8, CRC-8, BTC-8, CTC-8, ICC-8AL, CRC-8AL, BTC-8AL, CTC-8AL, CTC-8WC, TC-8WM, or TC-8WAM are authorized for acetylene only. These cylinders are filled with a porous mass that distributes the solvent used to absorb and stabilize acetylene [1].¹ Unserviceable cylinders, therefore, may retain varying quantities of solvent and acetylene. Solvents approved for use in acetylene cylinders include acetone and dimethylformamide. Before disposing of one of these cylinders, it is important to take every precaution to safely handle the cylinder. Personnel thoroughly familiar with these cylinders and their contents should do this work. The following procedures should be observed.

1.1 Regulatory requirements. The preparation and processing of acetylene cylinders for disposal involves practices that may require the facility to obtain permits from federal, state, provincial, and/or local environmental agencies. Permits may be necessary for the control of air emissions and for the generation, treatment, and/or disposal of hazardous or solid waste. Any person who processes acetylene cylinders for disposal shall ensure that all necessary permits are in place before starting cylinder processing.

1.2 Cylinder preparation. Recover, to the extent possible, any residual acetylene in the cylinder. Vent the empty cylinder for a minimum of 24 hours through a recovery system operated at 0 psig (0 kPa) or, where permissible, allow the cylinder to vent through a manifold system regulated at less than 15 psig (103 kPa), for a minimum of 24 hours until the pressure gauge reads 0 psig (0 kPa).² The

temperature must be above 45 °F (7.2 °C). If there is no gas flow the valve may be clogged or inoperable. Close the valve and set the cylinder aside for special attention by personnel trained to handle clogged or inoperable valves.

Weighing the cylinder helps determine the amount of acetylene remaining. Weighing is not an exact method of ensuring that the cylinder is completely empty. Cylinders will contain varying amounts of residual solvent, water, and dissolved acetylene depending on ambient temperature and other conditions.

1.3 Storage for disposal. Do not store unserviceable cylinders in a confined space because of the possible accumulation of acetylene or solvent vapors from the cylinders.

1.4 Disposal options

1.4.1 Dispose of properly scrapped acetylene cylinders in landfills that are permitted to accept industrial solid waste, otherwise identified as special waste in the United States. Inform disposal sites that cylinders may contain residual acetylene gas and will contain residual solvent, water, and a porous mass that may contain a small amount of asbestos.

1.4.1.1 Valve removal. After complying with 1.2, test for a clogged or inoperable valve before valve removal. Inject a small amount of low pressure (<15 psig [103 kPa]) nitrogen gas into the valve opening and listen for gas flow into and out of the cylinder. If there is no gas flow, the valve may be clogged or inoperable. Close the valve and set the cylinder aside for special attention by personnel trained to handle clogged or inoperable valves. If there is positive gas flow, cautiously remove the valve.

¹ References in this publication are shown by bracketed numbers and are listed in order of appearance in Section 2. References.

² In this publication, kPa shall indicate gauge pressure unless otherwise noted as (kPa, abs) for absolute pressure and (kPa, differential) for differential pressure.

Also, kPa values are rounded off per CGA P-11, *Metric Practice Guide for the Compressed Gas Industry* [2].

To be included in future revision of CGA P-22, *The Responsible Management & Disposition of Compressed Gases & Their Containers*.

WARNING: *To eliminate a possible source of ignition, ensure that all electrical equipment used in areas where acetylene is handled complies with all applicable national and local electrical codes. The core hole packing in older acetylene cylinders may contain asbestos. Refer to appropriate federal, state, or provincial regulations for proper handling and disposal.*

1.4.1.2 Cylinder decommissioning. Using a safe method, damage the internal valve connection threads so that the cylinder cannot be readily repaired. Likewise, all markings on the cylinder should be obliterated including the registered symbol, serial number, and identification markings.

WARNING: *Acetylene cylinders may contain asbestos filler. Cylinders should not be destroyed by removing the porous mass filler material from the steel shell unless it is done in accordance with federal, state, or provincial health, safety, and environmental regulations.*

1.4.1.3 Preparation for disposal. Allow devalved cylinders to lie outside in an isolated location for a minimum of 4 weeks during which the temperature must be above 40 °F (4.4 °C) for 1 week. This allows the small amounts of dissolved acetylene that may remain after cylinder preparation in 1.2 to safely dissipate from the cylinder. Position cylinders so that rainwater does not enter the cylinder through the valve well or accumulate on the cylinder head.

Cylinders containing water or excess solvent shall have all free liquids removed before cylinder disposal since free liquids are prohibited from disposal in landfills. Solvent that saturates the filler material does not have to be removed. The solvent material will remain entrapped in the filler material even after prolonged exposure to the atmosphere.

1.4.2 An option to preparing acetylene cylinders for disposal in landfills is to recover the acetylene solvent. Solvent recovery may be available in certain areas through private or commercial arrangements. When the solvent recovery option is selected, acetylene cylinders are first prepared as described in 1.2. The processing for disposal is typically done after the solvent recovery process. These activities should be prearranged with the solvent recovery contractor to conform to the practices and precautions described in 1.3, 1.4.1, and 1.5.

1.5 Transportation. Acetylene cylinders being shipped for disposal may be subject to DOT and Transport Canada regulations. Consult with your transportation department, carrier, and disposal contractor to determine the applicable shipping requirements. Do not transport scrapped cylinders in a confined space because of the possible accumulation of acetylene or solvent vapors from the cylinders.

2 References

[1] CGA G-1, *Acetylene*, Compressed Gas Association, 1725 Jefferson Davis Hwy., Suite 1004, Arlington, VA 22202.

[2] CGA P-11, *Metric Practice Guide for the Compressed Gas Industry*, Compressed Gas Association, 1725 Jefferson Davis Hwy., Suite 1004, Arlington, VA 22202.

| | | | |
|---------|--|--------|--|
| A-1 | Safe Handling & Storage of Compressed Gases | G-10.1 | Commodity Specification for Nitrogen |
| A-3 | Filling of Industrial & Medical Nonflammable Compressed Gas Cylinders | G-11.1 | Commodity Specification for Argon |
| A-4 | Charac. & Safe Handling of Medical Gases | G-12 | Hydrogen Sulfide |
| A-5 | Safe Handling of Liquefied Nitrogen & Argon | HB-3 | Handbook of Compressed Gases |
| A-6 | Highway Transport of Gases | P-1 | Safe Handling of Compressed Gases in Containers |
| A-7 | Charac. & Safe Handling of Carbon Dioxide | P-2 | Charac. & Safe Handling of Medical Gases |
| A-8 | Charac. & Safe Handling of Cryogenic Liquid & Gaseous Oxygen | P-2.5 | Transfiling of High Pressure Gaseous Oxygen to be Used for Respiration |
| A-9 | Handling Acetylene Cylinders in Fire Situations | P-2.6 | Transfiling of Liquid Oxygen to be Used for Respiration |
| C-1 | Methods for Hydrostatic Testing of Compressed Gas Cylinders | P-2.7 | Guide for the Safe Storage, Handling & Use of Portable Liquid Oxygen Systems in Health Care Facilities |
| C-3 | Standards for Welding on Thin Walled Steel Cylinders | P-5 | Suggestions for the Care of High-Pressure Air Cylinders for Underwater Breathing |
| C-4 | ANSI Method of Marking Portable Compressed Gas Containers to Identify the Material Contained | P-6 | Standard Density Data, Atmospheric Gases & Hydrogen |
| C-5 | Cylinder Service Life—Seamless Steel High Pressure Cylinders | P-7 | Standard for Requal. of Cargo Tank Hose Used in the Transfer of Compressed Gases |
| C-6 | Standards for Visual Inspec. of Steel Compressed Gas Cylinders | P-8 | Safe Practices Guide for Air Separation Plants |
| C-6.1 | Standards for Visual Inspec. of High Pressure Aluminum Compressed Gas Cylinders | P-9 | The Inert Gases: Argon, Nitrogen & Helium |
| C-6.2 | Guidelines for Visual Inspec. & Requal. of Fiber Reinforced High Pressure Cylinders | P-10 | Standard for Vinyl Chloride Monomer Tank Car Manway Cover & Protective Housing Arrangement & Emergency Safety Kit |
| C-6.3 | Guidelines for Visual Inspec. & Requal. of Low Pressure Aluminum Compressed Gas Cylinders | P-11 | Metric Practice Guide for the Compressed Gas Industry |
| C-7 | Guide to the Preparation of Precautionary Labeling & Marking of Compressed Gas Containers | P-12 | Safe Handling of Cryogenic Liquids |
| C-8 | Standard for Requal. of DOT-3HT Seamless Steel Cylinders | P-13 | Safe Handling of Liquid Carbon Monoxide |
| C-9 | Standard Color Marking of Compressed Gas Containers Intended for Medical Use | P-14 | Accident Prevention in Oxygen-Rich & Oxygen-Deficient Atmospheres |
| C-10 | Recomm. Procedures for Changes of Gas Service for Compressed Gas Cylinders | P-15 | Filling of Industrial & Medical Non-Flammable Compressed Gas Cylinders |
| C-11 | Recomm. Practices for Inspec. of Compressed Gas Cylinders at Time of Manufacture | P-16 | Recomm. Procedures for Nitrogen Purging of Tank Cars |
| C-12 | Qualification Procedure for Acetylene Cylinder Design | P-17 | Procedures for Pneumatic Retesting of Cargo & Portable Tanks |
| C-13 | Guidelines for Periodic Visual Inspec. & Requal. of Acetylene Cylinders | P-18 | Standard for Bulk Inert Gas Systems at Consumer Sites |
| C-14 | Procedures for Testing of DOT Cylinder/Safety Relief Device Systems | P-19 | Hazard Ratings for Compressed Gases |
| C-15 | Procedures for Cylinder Design Proof & Service Performance Tests | P-20 | Standard for the Classification of Toxic Gas Mixtures |
| C-16 | CGA Registration Program for Cylinder Owner Symbols | P-21 | Guidelines for the Development of Pre-Trip Inspec. Check List & Reports for MC 338/TC 338 & TC 341 Cargo Tanks |
| C-16.1 | CGA Cylinder Owner's Registration Symbols & Company Names | P-22 | The Responsible Management & Disposition of Compressed Gases & Their Containers |
| CGA-341 | Standard for Insulated Cargo Tank Specification for Cryogenic Liquids | P-23 | Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components |
| E-1 | Standard Connection for Regulator Outlets, Torches & Fitted Hose for Welding & Cutting Equip | S-1.1 | Pressure Relief Device Standards - Part 1-Cylinders for Compressed Gases |
| E-2 | Hose Line Check Valve Standards for Welding & Cutting | S-1.2 | Pressure Relief Device Standards-Part 2-Cargo & Portable Tanks for Compressed Gases |
| E-3 | Pipeline Regulator Inlet Connection Standards | S-1.3 | Pressure Relief Device Standards-Part 3-Compressed Gas Storage Containers |
| E-4 | Standard for Gas Pressure Regulators | S-7 | Method for Selecting Pressure Relief Devices for Compressed Gas Mixtures for Cylinders |
| E-5 | Torch Standard for Welding & Cutting | SB-1 | Hazards of Refilling Compressed Refrigerant (Halogenated Hydrocarbons) Gas Cylinders |
| E-6 | Standard for Hydraulic Type Pipe Line Protective Devices | SB-2 | Oxygen-Deficient Atmospheres |
| E-7 | ANSI for Medical Gas Regulators & Flowmeters | SB-4 | Handling Acetylene Cylinders in Fire Situations |
| E-9 | Standard for Medium Pressure (3000 PSIG) Flexible P.T.F.E.-Lined Pigtaills for Compressed Gas Service | SB-5 | Hazards of Reusing Disposable Refrigerant (Halogenated Hydrocarbon) Gas Cylinders |
| G-1 | Acetylene | SB-6 | Nitrous Oxide Safety & Control |
| G-1.1 | Commodity Specification for Acetylene | SB-7 | Rupture of Oxygen Cylinders in the Diving Industry |
| G-1.2 | Recommendations for Chemical Acetylene Metering | SB-8 | Use of Oxy-Fuel Gas Welding & Cutting Apparatus |
| G-1.3 | Acetylene Transmission for Chemical Synthesis | SB-9 | Recomm. Practice for the Outfitting & Operation of Vehicles Used in the Transport. & Transfiling of Liquid Oxygen to be Used for Respiration |
| G-1.5 | Carbide Lime - Its Value & Its Uses | SB-10 | Correct Labeling & Proper Fittings on Cylinders/Containers |
| G-1.6 | Recomm. Practices for Mobile Acetylene Trailer Systems | SB-11 | Use of Rubber Welding Hose |
| G-1.7 | Standard for Storage & Handling of Calcium Carbide in Containers | SB-12 | Use of Regulator Pressure Gauges |
| G-2 | Anhydrous Ammonia | SB-13 | Use of Regulators on Compressed Gas Cylinders Over 3000 psig |
| G-2.1 | ANSI Safety Requirements for the Storage & Handling of Anhydrous Ammonia | SB-14 | Helium Gas for Filling Balloons |
| G-2.2 | Guideline Method for Determining Minimum of 0.2% Water in Anhydrous Ammonia | SB-15 | Avoiding Hazards in Confined Work Spaces During Maintenance, Construction, & Similar Activities |
| G-3 | Sulfur Dioxide | SB-16 | Use of High Flow Oxy-Fuel Gas Heating Torch Apparatus |
| G-4 | Oxygen | SB-18 | Use of Refrigerant (Halogenated Hydrocarbons) Recovery Cylinders |
| G-4.1 | Cleaning Equip. for Oxygen Service | TB-2 | Guidelines for Inspec. & Repair of MC-330 & MC-331 Anhydrous Ammonia Cargo Tanks |
| G-4.3 | Commodity Specification for Oxygen | TB-3 | Hose Line Flashback Arrestors |
| G-4.4 | Industrial Practices for Gaseous Oxygen Transmission & Distribution Piping Systems | TB-4 | Certification for Exchange Product or Customer Pickup of Bulk Medical Liquids |
| G-4.5 | Commodity Specification for Oxygen Produced by Chemical Reaction | TB-6 | Evidence of Ownership of Compressed Gas Cylinders |
| G-4.6 | Oxygen Compressor Installation Guide | TB-6.1 | Poster version |
| G-4.8 | Safe Use of Aluminum Structured Packing for Oxygen Distillation | TB-9 | Guidelines for the Proper Handling & Use of the CGA 530/710 Series "Ultra High Integrity Service" Connections |
| G-5 | Hydrogen | TB-10 | Method of Calculating the Acceptable Level of an Impurity in Carbon Dioxide for Carbonated Beverage Applications |
| G-5.3 | Commodity Specification for Hydrogen | TB-11 | Sulfur Dioxide Tank Truck, Cargo Tank, Connections |
| G-5.4 | Standard for Hydrogen Piping at Consumer Locations | V-1 | CGA Standard for Compressed Gas Cylinder Valve Outlet & Inlet Connections |
| G-6 | Carbon Dioxide | V-5 | Diameter Index Safety System |
| G-6.1 | Standards for Low Pressure Carbon Dioxide Systems at Consumer Sites | V-6 | Standard Cryogenic Liquid Transfer Connections |
| G-6.2 | Commodity Specification for Carbon Dioxide | V-6.1 | Standard Carbon Dioxide Transfer Connections |
| G-6.3 | Carbon Dioxide Cylinder Filling & Handling Procedures | V-7 | Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures |
| G-6.4 | Safe Transfer of Low Pressure Liquefied Carbon Dioxide in Cargo Tanks, Tank Cars & Portable Containers | V-9 | ANSI, CGA Standard for Compressed Gas Cylinder Valves |
| G-6.5 | Standard for Small Stationary Low Pressure Carbon Dioxide Systems | | |
| G-6.6 | Standard for Elastomer Type Carbon Dioxide Bulk Transfer Hose | | |
| G-7 | Compressed Air for Human Respiration | | |
| G-7.1 | ANSI Commodity Specification for Air | | |
| G-8.1 | Standard for Nitrous Oxide Systems at Consumer Sites | | |
| G-9.2 | Commodity Specification for Nitrous Oxide | | |
| G-9.1 | Commodity Specification for Helium | | |

Appendix B
HAZWOPER
Certificates

APPENDIX B

HAZWOPER CERTIFICATES

CERTIFICATE OF ACHIEVEMENT

This certificate has been awarded to:

Rick Warwick

of

Associated Chemical & Environmental Services (ACES)

for the successful completion of
40 hours Training

in compliance with:

OSHA 29CFR 1910.120
Hazardous Waste Operations

Date Completed: July 20, 1987

Taught By: Richard S. Sentele - Safety & Training (ACES)

Course Instructor Signature: Rick Sentele OHST.



A **tyco** INTERNATIONAL LTD. COMPANY

Certificate of Training

RICK WARWICK

*Has Successfully Completed 8-Hours of
HAZWOPER Refresher Training*

[In Accordance With 29 CFR 1910.120(e)(8)]

Awarded on November 13, 2000

Robert M. Poll, CIH, CSP
Health and Safety Manager

MEDICAL CLEARANCE

ATTN: Ms. Vicky Sowder
Earth Tech
200 Vine Street
Wilder, KY 41076

September 2, 2000

RE: Employee: Rick A. Warwick
SSN: 272-52-1123

Exam No: 416842
Exam Date: 08/24/00

Mr. Warwick has completed a(n) Annual Hazwoper
Examination for ETR ETIRIC12 with the following results and clearances:

YES NO

[X] [] To work with HAZARDOUS MATERIALS in accordance with 29 CFR 1910.120.

[X] [] To use RESPIRATORY PROTECTIVE EQUIPMENT in accordance with 29 CFR 1910.134.

Work-related limitations and additional recommendations:

NONE.

By separate letter, Mr. Warwick has been informed of the medical
findings of this examination and their specific health implications.

Elayne F. Theriault, MD
Elayne F. Theriault, M.D.
Medical Director

Certificate of Completion

This certificate was presented to

BRENT EDWARDS

for successful completion of the

40-HOUR OSHA HAZARDOUS WASTE SITE COURSE

in accordance with the

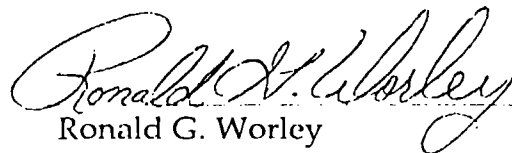
**OSHA Hazardous Waste and Emergency Response Operations Standard
29CFR (1910.120)**

July 09, 1999

Date:

0706-0999-400E-02

Certificate number:


Ronald G. Worley
President

R. G. WORLEY and ASSOCIATES, INC.

MEDICAL CLEARANCE

ATTN: Ms. Vicky Sowder
Earth Tech
200 Vine Street
Wilder, KY 41076

June 29, 2000

RE: Employee: Brent W. Edwards
SSN: 268-90-5914

Exam No: 405436
Exam Date: 06/23/00

Mr. Edwards has completed a(n) Annual Hazwoper
Examination for ETR ETIRIC12 with the following results and clearances:

YES NO

--- ---

[X] [] To work with HAZARDOUS MATERIALS in accordance with 29 CFR 1910.120.

[X] [] To use RESPIRATORY PROTECTIVE EQUIPMENT in accordance with 29 CFR 1910.134.

Work-related limitations and additional recommendations:

NONE.

By separate letter, Mr. Edwards has been informed of the medical
findings of this examination and their specific health implications.

Elayne F. Theriault, MD
Elayne F. Theriault, M.D.
Medical Director



A **tyco** INTERNATIONAL LTD. COMPANY

CERTIFICATE OF TRAINING

This Certifies That

Brent Edwards

has successfully completed 8 hours of instruction in
OSHA Hazardous Waste Operations and Emergency Response Refresher Training

Prepared and conducted on July 7, 2000
by EARTH TECH to
Comply with OSHA 29 CFR 1910.120(e)(8)

A handwritten signature in cursive script, reading "Dale M. Prokopchak".

Dale M. Prokopchak, CIH, CSP

Director

Industrial Hygiene and Safety Programs

**Appendix C Hazard
Communication
Program**

APPENDIX C

HAZARD COMMUNICATION PROGRAM

HAZARD COMMUNICATION PROGRAM

SECTION

- A. Introduction
- B. Hazard Communication Program
- C. Employee Notification Procedure for Hazardous Materials
- D. Education (Training)
- E. Hazardous Chemical/Substance Labeling
- F. Material Safety Data Sheets (MSDSs)
- G. Contractor/Sub-contractor Notification
- H. Acquisition and Deletion of Materials
- I. Exhibits
 - 1. *Training Record*
 - 2. *Labeling*
 - 3. *Contractor Notification Form*

EARTH TECH
HAZARD COMMUNICATION PROGRAM

A. INTRODUCTION

November 25, 1983, the Federal Hazards Communications Regulation was promulgated as law. The regulation is very complex in comparison to many regulations promulgated prior to 1983.

This regulation, unlike the majority, deals with the physical and health hazards associated with hazardous substances used in the workplace. The major thrust of the regulation deals with the employee's "Right To Know" concerning hazards associated with materials in their workplace.

The impact of this regulation has a far-reaching impact. Most important is the assurance that each employee of Earth Tech is knowledgeable of hazards they may be exposed to under any foreseeable condition. First, we will make every effort possible to ensure such knowledge is made available and second, failure to comply could result in an employee being injured, which cannot be tolerated.

In order to protect employees and company assets from unwanted liabilities, it is imperative the contained program be followed by all personnel of Earth Tech.

Responsibility for coordination of the program is through the Company HSM. This function is responsible for continual monitoring and maintenance of the program. Any questions concerning the program should be addressed to that office. Integration of the program into the various plant operations is the responsibility of the area and plant managers.

B. HAZARD COMMUNICATION PROGRAM - CORPORATE POLICY

Background

The federal Government passed the final Hazard Communication Regulation November 25, 1983 with the compliance date for industry being May 25, 1986.

The purpose of this regulation is to place information in the hands of companies and their employees relative to hazardous materials they purchase and work with.

Purpose

The purpose of this program is to ensure that all employees (including seasonal and part-time) of Earth Tech and outside contractors working within the facilities of the company, are aware and knowledgeable of the hazards they may be exposed to or work with.

Program

1. **Hazard Identification** - Materials used in all facilities will be reviewed to determine if hazardous ingredients exist solely or in combination with other components. All new

materials entering the facilities must be accompanied or preceded with a valid material safety data sheet (MSDS).

2. **Container Labeling** - Each container of material entering any of the facilities must be properly labeled by the manufacturer or supplier. Such labeling should include material name, a description of associated hazards (physical and health hazards), first-aid measures, personal protective equipment and emergency phone numbers.

Any container received without proper labeling cannot enter the site until properly labeled.

3. **Material Safety Data Sheets (MSDSs)** - All hazardous materials must be a MSDS furnished by either the supplier and/or received without proper information requires immediate contact with the supplier or manufacturer to request necessary information. MSDSs must be maintained in an orderly fashion and be available for any employee to read.
4. **Posters** - Posters will be posted as required per state-specific programs. These posters must be posted and available to all employees.
5. **Pipe/Vessel Labeling** - Pipes or piping systems and vessels containing hazardous materials must be labeled. The responsibility for proper labeling is vested in the RM.
6. **Employee Information and Training Programs** - Will be conducted regarding:
 - a. Requirements of the regulation,
 - b. Hazardous chemical or materials in the work area,
 - c. Location of the written Hazards Communication Program,
 - d. Methods of detecting the presence or release of a hazardous material,
 - e. Physical and health hazards of chemicals or materials,
 - f. Measures employees can take to protect themselves from chemical hazards,
 - g. Explanation of container labels, and
 - h. Explanation of the material safety data sheet (MSDS) and how to read and understand them.
7. **Contractor Notification** - In the event outside contractors' employees are working in the facilities, the SSO and/or RM is responsible for informing the contractor of any associated hazards their employees may be exposed to (see enclosures). Additionally, any materials being brought into any of the facilities requires the contractor to furnish MSDSs to the SSO or RM prior to bringing the material(s) on the site.
8. **Earth Tech** - Assumes no responsibility for evaluation of chemical hazards associated with products (either purchased or on trial). The Company will rely on such evaluations being completed by the material manufacturer or supplier. Additionally, the Company assumes no responsibility for information contained on MSDSs either in content, accuracy or format of the MSDS.
9. **Acquisition of Materials** - Requires the determination of potential hazards. All new materials acquired, either production or trial, require evaluation before introduction into

the plants. The determination is made via the MSDS and it must be requested at the time facilities ordering a new product or before a trail material is received.

10. ***Deletion of Materials*** - Requires notification of the SSO or RM. The MSDS **must not be destroyed!** Any MSDS associated with a deleted material requires the MSDS to be marked as obsolete and the date it was obsolete. The MSDS should then be placed in an inactive file and retained indefinitely, See Section I of this Hazard Communication.

C. EMPLOYEE NOTIFICATION PROCEDURE FOR HAZARDOUS MATERIALS

federal and state regulations require notification and education of all employees working with or around hazardous materials. The following procedure for such notification and education is mandatory.

Notification

Employees at all facilities of **Earth Tech** with potential of exposure to hazardous chemicals or materials must receive proper education and training prior to working in any of the plant facilities. This notification includes any seasonal or part-time staff members hired to perform work on Company projects as well.

Employees transferring into other facilities and having received initial educational information are required to be notified of the hazards associated with their new work environment.

Employees assigned to non-routine tasks, i.e., vessel cleaning, confined space or specific maintenance work will be advised of those associated hazards via training specific to the need and may include:

- a. Health and/or Safety regulatory training, and/or
- b. U.S. EPA or state sponsored training

The initial training will include:

1. An overview of the requirements contained in the Hazard Communication Regulation;
2. Location and availability of the material safety data sheet (MSDS) files, hazardous chemical list, and the Company's written Hazard Communication Program;
3. Physical and health effects of hazardous chemicals;
4. Methods and observation techniques used to determine the presence or release of hazardous chemicals in the work area;
5. How to lessen or prevent exposure to these hazardous chemicals through usage of control equipment, work practices, and personal protective equipment;
6. Steps the Company has taken to lessen or prevent exposure to these chemicals;
7. Emergency procedures to follow in the event of a release of a chemical; and

8. How to read labels and MSDSs, understand the same, and obtain appropriate hazard information.

Each site indicating those employees who have completed the training will maintain a log.

Each employee receiving training will be required to acknowledge such training by their signature on the **Employee Training Record Form** (see Exhibit 1, Section J).

Hazards Of Non-Routine Tasks

Operations involving non-routine tasks where employee exposure(s) are existing, or potential, will be evaluated prior to the non-routine tasks. If evaluations indicate exposures above published permissible exposure limits (PELs), the following actions will be required before the non-routine task begins:

- a. Engineering controls or,
- b. Personal protective equipment

Responsibility

Administration of the Hazard Communication Program is the responsibility of the Earth Tech Program Manager. This function shall coordinate and monitor the overall program. Individual area and site managers are responsible for coordination and implementation of this program at the site level.

D. EDUCATION (TRAINING)

All employees (including seasonal and part-time) shall be trained regarding hazardous materials:

1. At time of initial hiring;
2. Whenever a new hazardous material is introduced into the work environment; and
3. When refresher training is deemed appropriate by the area manager, site manager, or the employee's supervisor.

The initial training will include:

1. An overview of the requirements contained in the Hazard Communication Regulation;
2. Location and availability of the material safety data sheet (MSDS) files, hazardous chemical list, and the Company's written Hazard Communication Program;
3. Physical and health effects of hazardous chemicals;
4. Methods and observation techniques used to determine the presence or release of hazardous chemicals in the work area;

5. How to lessen or prevent exposure to these hazardous chemicals through usage of control equipment, work practices, and personal protective equipment;
6. Steps the Company has taken to lessen or prevent exposure to these chemicals;
7. Emergency procedures to follow in the event of a release of a chemical; and
8. How to read labels and MSDSs, understand the same, and obtain appropriate hazard information.

A file of all employees trained on the project will be maintained at each site.

Each employee receiving training will acknowledge such training via their signature on the Employee Training Record Form (see Exhibit 1, Section J).

Completed, Employee Training Record Forms, shall be kept on file in the Employee Safety and Training Record Book, located near the MSDS station.

E. HAZARDOUS CHEMICAL/SUBSTANCE LABELING

All incoming materials must be labeled by the site where they are received.

Labeling Procedure

The evaluation requires the site receiving the material to:

1. Review the Material Safety Data Sheet book and/or inventory printout and determine the proper MSDS number for the received material.
2. Affix an HMIS Identification Label to each container (see Exhibit 2 and Exhibit 6 Section J) and enter; (Labels are located near MSDS station).
 - a. MSDS number in the white portion of the label,
 - b. Health, fire and reactivity numbers in the appropriate area of the label, and Personal protective equipment code in the appropriate space.

Once the proper labeling is affixed, the containers(s) may be placed on site.

All hazardous chemical substance labels shall have the MSDS number and hazard ratings affixed. In the event a site eliminates a material, the SSO or RM must be notified so the material safety data sheet (MSDS) may be deleted from the active file.

Labeling of containers is mandatory if the container is used by other than the person transferring the material or, if the container and contents will be used beyond one shift.

A. "container" is defined as anything holding hazardous chemicals or substances. This may include pipe and piping systems.

EARTH TECH INTERNAL CONTAINER LABELING SYSTEM

A system is incorporated company-wide which provides a simple means for the employee to quickly identify the associated hazards of material in a labeled container.

This identification system incorporates the Hazardous Materials Information System (HMIS) label. The label consists of a rectangular shape which is divided into the following sections:

| | | |
|---------------|-----------|---------------------------|
| BLUE | ~ ~ ~ ~ ~ | Health Hazard, |
| RED | ~ ~ ~ ~ ~ | Fire Hazard, |
| YELLOW | ~ ~ ~ ~ ~ | Reactivity Hazard, |
| and | | |
| WHITE | ~ ~ ~ ~ ~ | PPE Required |

Additionally, this labeling system incorporates a numerical system for identification of the degree of hazard as follows:

| | | |
|----------|-----------|------------------------|
| 0 | ~ ~ ~ ~ ~ | Minimal hazard |
| 1 | ~ ~ ~ ~ ~ | Slight hazard |
| 2 | ~ ~ ~ ~ ~ | Moderate hazard |
| 3 | ~ ~ ~ ~ ~ | Serious hazard |
| 4 | ~ ~ ~ ~ ~ | Severe hazard |

Earth Tech has incorporated another item to assist the employee with location of material safety data sheets. All material safety data sheets have a numerical number assigned which is placed at the top of the HMIS label.

The material safety data sheets are maintained by materials used on site and are maintained by the SSO and/or RM. The employee needs to only look up the MSDS to obtain more information about the contents of the container.

F. MATERIAL SAFETY & DATA SHEETS (MSDSs)

Each site is required to acquire and place in an orderly fashion, a material safety data sheet (MSDS) for each material classified as or containing "hazardous substances". The sheets are kept in numerical order in a three (3) ring binder which is labeled "Material Safety Data Sheets" and placed so the binder and sheets are available to any employee at any time.

The MSDSs are acquired from the manufacturer or supplier of the product. Acquisition of the MSDSs is the responsibility of the SSO or RM.

This site has established an alphabetical file system for MSDS. The MSDS are filed using their common names alphabetically.

The number assigned to the individual MSDS will be used in conjunction with the internal HMIS labeling system by placing the MSDS number in the top portion of the MSDS label.

When a material is no longer used (obsolete material) at the plant, the appropriate MSDS must be marked as obsolete. The number that is assigned to the obsolete MSDS must be retired.

Each employee will be taught how to read an MSDS and find necessary information on the sheet.

G. CONTRACTOR/SUB-CONTRACTOR NOTIFICATION

federal and/or state regulations require that contractors/sub-contractors be notified of areas they or their people will be working which contain hazardous substances. This notification includes information about protective measures to be taken and allows the opportunity for review of any MSDSs.

Notification must be made prior to beginning contracted work. The RM is responsible for the notification. Notification may be verbal but requires the completion and signing of the Contractor/subcontractor Notification form that they have been informed of the chemical hazards (see Exhibit 3, Section J). This signed statement must be retained as permanent record in the event regulatory officials request review of the documents. Additionally, a signed copy of the completed document should be given to all contractors.

Contractors working within all facilities of **Earth Tech** and using materials which are, or contain, hazardous substances (as defined within the Hazard Communication Regulation 1910.1200) are required to:

1. Give advanced notice to the proper site management of the materials they will use, where used, and where stored; and
2. Provide information (Materials Safety Data Sheets and labels) for those substances classified as hazardous substances.

Site personnel acquiring the contractors are responsible for obtaining and reviewing information required in items 1 and 2.

If there are hazards associated with the materials, it is the responsibility of site management to inform employees of the hazards and precautionary measures to be taken and to provide an MSDS for employee review.

In the event there are questions regarding potential health or physical hazards associated with materials, the Company Program Manager should be contacted for direction.

H. ACQUISITION AND DELETION OF MATERIALS

Acquisition of Materials

Any material received for production use or trial cannot enter a site without an MSDS or label. In the event a material is received by a site and it cannot be identified, the RM should contact the supplier and/or manufacturer and request an MSDS immediately. If the supplier or manufacturer does not comply with the request, the Company Program Manager should be contacted for direction.

Any material received by truck without proper paperwork, including an MSDS, cannot be received until the proper paperwork is available.

Deletion of Materials

Any material deleted from a site requires that the existing material safety data sheet be marked as obsolete and the date it was removed from the facilities written on the sheet. Remove the obsolete MSDS from the active MSDS book and place it in an "inactive" file.

NOTE: Do not throw away any original MSDSs or updates. These documents may be considered Medical Records - retain for 30 years.

I. EXHIBITS

See the following pages for exhibits 1 through 3.

EXHIBIT 1

EARTH TECH EMPLOYEE EDUCATION & TRAINING RECORD HAZARD COMMUNICATION PROGRAM

NAME: _____ DATE: _____

PLANT LOCATION: _____

On this date I attended a Hazard Communication Training Program at the above plant location of Earth Tech. The following topics were taught:

1. An overview of the requirements contained in the federal/ state Hazard Communication Standard (Right To Know).
2. Location and availability of Material Safety Data Sheets (MSDSs), the Company's written Hazard Communication Program, and the list of hazardous substances found on this site.
3. Physical and health hazards associated with the materials I may be exposed to or work with.
4. Methods and observation techniques I can use to determine the presence or release of a hazardous substance. This included:
 - a. Smell (Odor data on the MSDS),
 - b. Sight (Appearance data on the MSDS),
 - c. Sound (High pressure leaks), and
 - d. Taste
5. How to lessen or prevent exposure to these hazards through usage of control equipment, work practices, and personal protective equipment.
6. Steps the Company has taken to lessen or prevent exposure to these substances.
7. Emergency procedures to follow in the event of a release of a hazardous substance.
8. How to read and understand MSDSs and labels to obtain appropriate information.

EMPLOYEE SIGNATURE: _____ DATE: _____

I CERTIFY THE ABOVE NAMED EMPLOYEE WAS TRAINED AS STATED.

TRAINER SIGNATURE: _____ DATE: _____

EXHIBIT 2

THE HAZARDOUS MATERIALS INFORMATION SYSTEM (HMIS LABELING)

What to look for:

Chemical materials may be stenciled on tanks, vats, drums, rail cars, etc.

The HMIS marking system may be used on many items and alerts you as to container contents and possible hazards associated with the material.

The HMIS system utilizes a rectangular shaped label with the following four (4) colors for hazard identification.

| | | |
|---------------|-----------|----------------------------|
| BLUE | ~ ~ ~ ~ ~ | Health Hazard |
| RED | ~ ~ ~ ~ ~ | Flammability |
| YELLOW | ~ ~ ~ ~ ~ | Reactivity |
| WHITE | ~ ~ ~ ~ ~ | Special information |

Additionally, the HMIS system incorporates a numerical system for identification of the degree of hazards as follows:

| | | |
|----------|-----------|--|
| 0 | ~ ~ ~ ~ ~ | Minimal hazard (this does not mean no hazard) |
| 1 | ~ ~ ~ ~ ~ | Slight hazard |
| 2 | ~ ~ ~ ~ ~ | Moderate hazard |
| 3 | ~ ~ ~ ~ ~ | Serious hazard |
| 4 | ~ ~ ~ ~ ~ | Severe hazard |

White (MSDS Number) -----

Blue (Health hazard) -----

Red (Fire Hazard) -----

Yellow (Reactivity Hazard) -----

Personal Protective -----

HAZARD RATINGS

EXHIBIT 3

CONTRACTOR / SUBCONTRACTOR NOTIFICATION OF HAZARDOUS SUBSTANCES

Both federal and state regulations require you, as a contractor or subcontractor, to be notified of areas within this site which contain hazardous chemicals or materials as defined within the **Hazard Communication Standard**. Additionally, your employees must have access to any material safety data sheet relative to their existing and/or potential exposures.

Your employees will be working in the following area(s) which contain hazardous chemicals or materials (as defined by governmental definition).

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

A listing of these materials and associated material safety data sheets are maintained by the plant manager.

By way of your signature, you attest that Site Management has informed you of the presence of hazardous materials within the plant and where the appropriate MSDS file is maintained.

Contractor Signature & Date

Project Management Signature & Date

APPENDIX D

MATERIAL SAFETY DATA SHEETS



Genium Publishing Corporation

1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 467
Automotive Gasoline, Lead-free

Issued: 10/81

Revision: A, 9/91

Section 1. Material Identification

Automotive Gasoline, Lead-free, Description: A mixture of volatile hydrocarbons composed mainly of branched-chain paraffins, cycloparaffins, olefins, naphthenes, and aromatics. In general, gasoline is produced from petroleum, shale oil, Athabasca tar sands, and coal. Motor gasolines are made chiefly by cracking processes, which convert heavier petroleum fractions into more volatile fractions by thermal or catalytic decomposition. Widely used as fuel in internal combustion engines of the spark-ignited, reciprocating type. Automotive gasoline has an octane number of approximately 90. A high content of aromatic hydrocarbons and a consequent high toxicity are also associated with a high octane rating. Some gasolines sold in the US contain a minor proportion of tetraethyllead, which is added in concentrations not exceeding 3 ml per gallon to prevent engine "knock." However, methyl-tert-butyl ether (MTBE) has almost completely replaced tetraethyllead.

Other Designations: CAS No. 8006-61-9, benzin, gasoline, gasolene, motor spirits, natural gasoline, petrol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*TM for a suppliers list.

R 1
I 2
S 2*
K 4
* Skin absorption

35

NFPA



HMS

H 2

F 3

R 1

PPG†

† Sec. 8

Cautions: Inhalation of automotive gasoline vapors can cause intense burning in throat and lungs, central nervous system (CNS) depression, and possible fatal pulmonary edema. Gasoline is a dangerous fire and explosion hazard when exposed to heat and flames.

Section 2. Ingredients and Occupational Exposure Limits

Automotive gasoline, lead-free*

1990 OSHA PELs

8-hr TWA: 300 ppm, 900 mg/m³

15-min STEL: 500 ppm, 1500 mg/m³

1990-91 ACGIH TLVs

TWA: 300 ppm, 890 mg/m³

STEL: 500 ppm, 1480 mg/m³

1990 NIOSH REL

None established

1985-86 Toxicity Data*

Man, inhalation, TC_{LD}: 900 ppm/1 hr; toxic effects include sense organs and special senses (conjunctiva irritation), behavioral (hallucinations, distorted perceptions), lungs, thorax, or respiration (cough)

Human, eye: 140 ppm/8 hr; toxic effects include mild irritation

Rat, inhalation, LC₅₀: 300 g/m³/5 min

A typical modern gasoline composition is 80% paraffins, 14% aromatics, and 6% olefins. The mean benzene content is approximately 1%. Other additives include sulfur, phosphorus, and MTBE.

† See NIOSH, RTECS (LX3300000), for additional toxicity data.

Section 3. Physical Data

Boiling Point: Initially, 102 °F (39 °C); after 10% distilled, 140 °F (60 °C); after 50% distilled, 230 °F (110 °C); after 90% distilled, 338 °F (170 °C); final boiling point, 399 °F (204 °C)

Vapor Density (air = 1): 3.0 to 4.0

Density/Specific Gravity: 0.72 to 0.76 at 60 °F (15.6 °C)

Water Solubility: Insoluble

Appearance and Odor: A clear (gasoline may be colored with dye), mobile liquid with a characteristic odor recognizable at about 10 ppm in air.

Section 4. Fire and Explosion Data

Flash Point: -45 °F (-43 °C)

Autoignition Temperature: 536 to 853 °F (280 to 456 °C)

LEL: 1.3% v/v

UEL: 6.0% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or alcohol foam as extinguishing media. Use of water may be ineffective to extinguish fire, but use water spray to knock down vapors and to cool fire-exposed drums and tanks to prevent pressure rupture. Do not use a solid stream of water since it may spread the fuel.

Unusual Fire or Explosion Hazards: Automobile gasoline is an OSHA Class IB flammable liquid and a dangerous fire and explosion hazard when exposed to heat and flames. Vapors can flow to an ignition source and flash back. Automobile gasoline can also react violently with oxidizing agents.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode, and full protective clothing. When the fire is extinguished, use nonsparking tools for cleanup. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Automotive gasoline is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Automotive gasoline can react with oxidizing materials such as peroxides, nitric acid, and perchlorates.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of automotive gasoline can produce oxides of carbon and partially oxidized hydrocarbons.

Section 6. Health Hazard Data

Carcinogenicity: In 1990 reports, the IARC list gasoline as a possible human carcinogen (Group 2B). Although the IARC has assigned an overall evaluation to gasoline, it has not assigned an overall evaluation to specific substances within this group (inadequate human evidence).

Summary of Risks: Gasoline vapors are considered moderately poisonous. Vapor inhalation can cause central nervous system (CNS) depression and mucous membrane and respiratory tract irritation. Brief inhalations of high concentrations can cause a fatal pulmonary edema. Reported responses to gasoline vapor concentrations are: 160 to 270 ppm causes eye and throat irritation in several hours; 500 to 900 ppm causes eye, nose, and throat irritation, and dizziness in 1 hr; and 2000 ppm produces mild anesthesia in 30 min. Higher concentrations are intoxicating in 4 to 10 minutes. If large areas of skin are exposed to gasoline, toxic amounts may be absorbed. Repeated or prolonged skin exposure causes dermatitis. Certain individuals may develop hypersensitivity. Ingestion can cause CNS depression. Pulmonary aspiration after ingestion can cause severe pneumonitis. In adults, ingestion of 20 to 50 g gasoline may produce severe symptoms of poisoning.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Skin, eye, respiratory and central nervous systems.

Primary Entry Routes: Inhalation, ingestion, skin contact.

Acute Effects: Acute inhalation produces intense nose, throat, and lung irritation; headaches; blurred vision; conjunctivitis; flushing of the face; mental confusion; staggering gait; slurred speech; and unconsciousness, sometimes with convulsions. Ingestion causes inebriation (drunkenness), vomiting, dizziness, fever, drowsiness, confusion, and cyanosis (a blue to dark purplish coloration of skin and mucous membrane caused by lack of oxygen). Aspiration causes choking, cough, shortness of breath, increased rate of respiration, excessively rapid heartbeat, fever, bronchitis, and pneumonitis. Other symptoms following acute exposure include acute hemorrhage of the pancreas, fatty degeneration of the liver and kidneys, and passive congestion of spleen.

Chronic Effects: Chronic inhalation results in appetite loss, nausea, weight loss, insomnia, and unusual sensitivity (hyperesthesia) of the distal extremities followed by motor weakness, muscular degeneration, and diminished tendon reflexes and coordination. Repeated skin exposure can cause blistering, drying, and lesions.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard.

Give conscious victim a mixture of 2 tablespoons of activated charcoal mixed in 8 oz of water to drink. Consult a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Use nonsparking tools. Take up small spills with sand or other noncombustible adsorbent. Dike storage areas to control leaks and spills. Follow applicable OSHA regulations (29 CFR 1910.120).

Aquatic Toxicity: Bluegill, freshwater, LC₅₀, 8 ppm/96 hr.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

RCRA Hazardous Waste (40 CFR 261.21): Characteristic of ignitability

CERCLA Hazardous Substance (40 CFR 302.4): Not listed

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Since contact lens use in industry is controversial, establish your own policy.

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. There are no specific NIOSH recommendations. However, for vapor concentrations not immediately dangerous to life or health, use chemical cartridge respirator equipped with organic vapor cartridge(s), or a supplied-air respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Materials such as neoprene or polyvinyl alcohol provide excellent/good resistance for protective clothing. Note: Resistance of specific materials can vary from product to product.

Ventilation: Provide general and local explosion-proof exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in closed containers in a cool, dry, well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. Avoid direct sunlight. Storage must meet requirements of OSHA Class IB liquid. Outside or detached storage preferred.

Engineering Controls: Avoid vapor inhalation and skin or eye contact. Consider a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Indoor use of this material requires explosion-proof exhaust ventilation to remove vapors. Only use gasoline as a fuel source due to its volatility and flammable/explosive nature. Practice good personal hygiene and housekeeping procedures. Wear clean work clothing daily.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Gasoline (including casing-head and natural)

DOT Hazard Class: Flammable liquid

ID No.: UN1203

DOT Label: Flammable liquid

DOT Packaging Exceptions: 173.118

DOT Packaging Requirements: 173.119

IMO Shipping Name: Gasoline

IMO Hazard Class: 3.1

ID No.: UN1203

IMO Label: Flammable liquid

IMDG Packaging Group: II

MSDS Collection References: 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 138, 140, 143, 146, 153, 159

Prepared by: M Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silverman, MD; Edited by: JR Stuart, MS

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Material Safety Data Sheets Collection:

Sheet No. 469
Fuel Oil No. 2

Issued: 10/81

Revision: A, 11/90

Section 1. Material Identification

Fuel Oil No. 2 Description: A mixture of petroleum hydrocarbons; a distillate of low sulfur content. Fuel oil no. 2 resembles kerosine. Used as a general-purpose domestic or commercial fuel in atomizing-type burners; as a fuel for trucks, ships and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.
Other Designations: CAS No. 68476-30-2, diesel oil.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*^(TM) for a suppliers list.

R 1
I -
S 2
K 2

NFPA



HMIS
H 0
F 2
R 0
PPG*
* Sec. 8

Cautions: Fuel oil No. 2 is a skin irritant and central nervous system depressant with high mist concentrations. It is an environmental hazard and a dangerous fire hazard when exposed to heat, flame, or oxidizers.

Section 2. Ingredients and Occupational Exposure Limits

Fuel oil No. 2*

1989 OSHA PEL
None established

1990-91 ACGIH TLV
None established

1988 NIOSH REL
None established

1985-86 Toxicity Data†
Rat, oral, LD₅₀: 9 g/kg; produces gastrointestinal effects (hypermotility, diarrhea)

* A complex mixture (<95%) of paraffinic, olefinic, naphthenic, and aromatic hydrocarbons; sulfur content (<0.5%); and benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)].

† Monitor NIOSH, RTECS (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 363 to 634 °F (184 to 334 °C)

Water Solubility: Insoluble

Viscosity: 268 centistoke at 100 °F (37.8 °C)

Pour Point:* <21 °F (-6 °C)

Specific Gravity: 0.8654 at 59 °F (15 °C)

Appearance and Odor: Brown, slightly viscous liquid.

* Pour point is the lowest temperature at which a liquid flows from an inverted test container.

Section 4. Fire and Explosion Data

Flash Point: 100 °F (38 °C) min.

Autoignition Temperature: 494 °F (257 °C)

LEL: 0.6% v/v

UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, foam, water fog or spray. Do not use a forced water spray directly on burning oil since this scatters the fire. Use a smothering technique to extinguish fire.

Unusual Fire or Explosion Hazards: Vapors may travel to an ignition source and flash back. This fuel oil's volatility is similar to gasoline's.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to health and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Fuel oil no. 2 is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Incompatible with strong oxidizing agents; heating greatly increases fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of fuel oil no. 2 yields various hydrocarbons and hydrocarbon derivatives and partial oxidation products including carbon dioxide, carbon monoxide, and sulfur dioxide.

Section 6. Health Hazard Data

Carcinogenicity: Although it has not assigned an overall evaluation to fuel oil No. 2, the IARC has evaluated distillate (light) fuel oils as not classifiable as human carcinogen (Group 3; animal evidence limited).

Summary of Risks: Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, stupor, convulsions, or unconsciousness, depending on concentration and time of exposure. Since intestinal absorption of longer chain hydrocarbons is lower than absorption from lighter fuels, a lesser degree of systemic effects and more diarrhea may result. When removed from exposed area, affected persons usually experience complete recovery. Hemorrhaging and pulmonary edema, progressing to renal involvement and chemical pneumonitis, may result if oil is aspirated into the lungs. These results are more likely when vomiting after ingestion rather than upon ingestion, as is often the case with lower viscosity fuels. A comparative ratio of oral-to-aspirated lethal doses may be 1 pt vs. 5 ml. Prolonged or repeated skin contact may cause irritation of the hair follicles and may block the sebaceous glands, producing a rash of acne pimples and spots, usually on arms and legs.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Central nervous system (CNS), skin, and mucous membranes.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Systemic effects from ingestion include gastrointestinal (GI) irritation, vomiting, diarrhea, and, in severe cases, CNS depression, progressing to coma and death. Inhalation of aerosol or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish coloration of the skin and mucous membranes caused by deficient blood oxygenation).

Chronic Effects: Repeated contact with the skin causes dermatitis.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. If large areas of the body are exposed or if irritation persists, get medical help immediately. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard.

Contact a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe aspiration pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become abnormal or symptoms develop, obtain a chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclamation or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Fuel oil no. 2 is an environmental hazard. Report large spills.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.21): Ignitable waste

CERCLA Hazardous Substance (40 CFR 302.4): Not listed

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for an OSHA Class II combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in areas of storage or use.

Engineering Controls: Avoid prolonged skin contact and vapor or mist inhalation. Use only in a well-ventilated area with personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil contaminated clothing. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Fuel oil

DOT Hazard Class: Combustible liquid

ID No.: NA1993

DOT Label: None

DOT Packaging Exceptions: 173.118a

DOT Packaging Requirements: None



Genium Publishing Corporation

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Schenectady, NY 12303-1836 USA
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Material Safety Data Sheets Collection:

Sheet No. 470
Diesel Fuel Oil No. 2-D

Issued: 10/81

Revision: A, 11/90

Section 1. Material Identification

Diesel Fuel Oil No. 2-D Description: Diesel fuel is obtained from the middle distillate in petroleum separation; a distillate oil of low sulfur content. It is composed chiefly of unbranched paraffins. Diesel fuel is available in various grades, one of which is synonymous with fuel oil No. 2-D. This diesel fuel oil requires a minimum Cetane No. (efficiency rating for diesel fuel comparable to octane number ratings for gasoline) of 40 (ASTM D613). Used as a fuel for trucks, ships, and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.

Other Designations: CAS No. 68334-30-5, diesel fuel.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*⁽⁷⁾ for a suppliers list.

Cautions: Diesel fuel oil No. 2-D is a skin irritant and central nervous depressant with high mist concentrations. It is an environmental hazard and moderate fire risk.

| | | |
|----------|---|------|
| R | 1 | NFPA |
| I | - | 2 |
| S | 2 | 0 |
| K | 2 | 0 |
| HMIS | | |
| H | 0 | |
| F | 2 | |
| R | 0 | |
| PPG* | | |
| * Sec. 8 | | |

Section 2. Ingredients and Occupational Exposure Limits

Diesel fuel oil No. 2-D*

1989 OSHA PEL

None established

1990-91 ACGIH TLV

Mineral Oil Mist

TWA: 5 mg/m³†

STEL: 10 mg/m³

1988 NIOSH REL

None established

1985-86 Toxicity Data‡

Rat, oral, LD₅₀: 9 g/kg produces gastrointestinal (hypermotility, diarrhea) effects

* Diesel fuel No. 2-D tends to be low in aromatics and high in paraffinics. This fuel oil is complex mixture of: 1) >95% paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, 2) sulfur (<0.5%), and 3) benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)]. Although low in the fuel itself, benzene concentrations are likely to be much higher in processing areas.

† As sampled by nonvapor-collecting method.

‡ Monitor NIOSH, RTECS (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 340 to 675 °F (171 to 358 °C)

Specific Gravity: <0.86

Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)

Water Solubility: Insoluble

Appearance and Odor: Brown, slightly viscous liquid.

Section 4. Fire and Explosion Data

Flash Point: 125 °F (52 °C) min.

Autoignition Temperature: >500 °F (932 °C)

LEL: 0.6% v/v

UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or foam to fight fire. Use a water spray to cool fire exposed containers. Do not use a forced water spray directly on burning oil since this will scatter the fire. Use a smothering technique for extinguishing fire.

Unusual Fire or Explosion Hazards: Diesel fuel oil No. 2-D is a OSHA Class II combustible liquid. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to pollution and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Diesel fuel oil No. 2-D is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: It is incompatible with strong oxidizing agents; heating greatly increases the fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of diesel fuel oil No. 2-D can produce various hydrocarbons and hydrocarbon derivatives, and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

Section 6. Health Hazard Data

Carcinogenicity: Although the IARC has not assigned an overall evaluation to diesel fuels as a group, it has evaluated occupational exposures in petroleum refining as an IARC probable human carcinogen (Group 2A). It has evaluated distillate (light) diesel oils as not classifiable as human carcinogens (Group 3).

Summary of Risks: Although diesel fuel's toxicologic effects should resemble kerosene's, they are somewhat more pronounced due to additives such as sulfurized esters. Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and loss of coordination, depending on concentration and exposure time. When removed from exposure area, affected persons usually recover completely. If vomiting occurs after ingestion and if oil is aspirated into the lungs, hemorrhaging and pulmonary edema, progressing to renal involvement and chemical pneumonitis, may result. A comparative ratio of oral to aspirated lethal doses may be 1 pt vs. 5 ml. Aspiration may also result in transient CNS depression or excitement. Secondary effects may include hypoxia (insufficient oxygen in body cells), infection, pneumatocele formation, and chronic lung dysfunction. Inhalation may result in euphoria, cardiac dysrhythmias, respiratory arrest, and CNS toxicity. Prolonged or repeated skin contact may irritate hair follicles and block sebaceous glands, producing a rash of acne pimples and spots, usually on arms and legs.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Central nervous system, skin, and mucous membranes.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Systemic effects from ingestion include gastrointestinal irritation, vomiting, diarrhea, and in severe cases central nervous system depression, progressing to coma or death. Inhalation of aerosols or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish discoloration of the skin and mucous membranes caused by deficient blood oxygenation).

Chronic Effects: Repeated contact with the skin causes dermatitis.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. If large areas of the body have been exposed or if irritation persists, get medical help immediately. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard.

Contact a physician immediately. Position to avoid aspiration.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe aspiration pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become abnormal or symptoms develop, obtain a chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use a noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclamation or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Diesel fuel oil No. 2-D spills may be environmental hazards. Report large spills.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

HA Designations

CRA Hazardous Waste (40 CFR 261.21): Ignitable waste

ERCLA Hazardous Substance (40 CFR 302.4): Not listed

ARA Extremely Hazardous Substance (40 CFR 355): Not listed

ARA Toxic Chemical (40 CFR 372.65): Not listed

SHA Designations

PC Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with a mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Gloves: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for a OSHA Class II combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in storage or use areas.

Engineering Controls: Avoid vapor or mist inhalation and prolonged skin contact. Wear protective rubber gloves and chemical safety glasses where contact with liquid or high mist concentration may occur. Additional suitable protective clothing may be required depending on working conditions. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil contaminated clothing. At least weekly laundering of work clothes is recommended. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)

Transport Name: Fuel oil

Hazard Class: Combustible liquid

No.: NA1993

Label: None

Packaging Exceptions: 173.118a

Packaging Requirements: None

OS Collection References: 1, 6, 7, 12, 73, 84, 101, 103, 126, 127, 132, 133, 136, 143, 146

Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** AC Darlington, MD; **Edited by:** JR Stuart, MS



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Material Safety Data Sheets Collection:

Sheet No. 720
Petroleum (Crude)

Issued: 8/90

Section 1. Material Identification

Petroleum (Crude) Description: A highly complex mixture of paraffinic, cycloparaffinic (naphthenic), and aromatic hydrocarbons with molecular weights ranging from the very lightest to over 6000; also containing small amounts of benzene hydrocarbons, sulfur, and oxygenated compounds. Used as a source of gasoline, petroleum ether, fuel and lubricating oils, liquid and solid petrolatum, butane, isopropyl alcohol, and many other products.

Other Designations: CAS No. 8002-05-9, base oil, coal liquid, coal oil, crude oil, petroleum crude, petroleum oil, rock oil, and seneca oil.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*^(TM) for a suppliers list.

R 1
I -
S 2
K 4

32 NFPA



HMIS
H 1
F 3
R 0
PPG*
* Sec. 8

Cautions: Petroleum (crude) is toxic by ingestion and is irritating by skin contact. It is a dangerous fire hazard when exposed to heat, flame, or powerful oxidizers. Its fumes are flammable, asphyxiating, and potentially toxic.

Section 2. Ingredients and Occupational Exposure Limits

Petroleum (crude), ca 100%

1989 OSHA PEL
None established

1989-90 ACGIH TLV
None established

1988 NIOSH REL
None established

1985-86 Toxicity Data*

Mouse, skin, TD₀₁: 3744 mg/kg administered intermittently over a 2-yr period in a number of separate, discrete doses produces tumorigenic effects; skin and appendages (tumors)

Comment: Crude petroleum is a complex mixture of volatile hydrocarbons and gases. So-called "sour crude" contains toxic and dangerous hydrogen sulfide gas (*MSDS Collection*, No. 52).

* See NIOSH, *RTECS* (SE7175000), for additional mutative and tumorigenic data.

Section 3. Physical Data

Melting Point: -51 °F (-46 °C)

Density: 0.780 to 0.970

Water Solubility: Insoluble

Appearance and Odor: A viscous, dark yellow to brown or greenish-black, oily liquid with an unpleasant odor. Petroleum's (crude light's) upper and lower odor thresholds are 0.5 and 0.1 ppm, respectively.

Section 4. Fire and Explosion Data

Flash Point: 20 to 90 °F (-6.7 to 32.2 °C)

Autoignition Temperature: None reported

LEL: None reported

UEL: None reported

Extinguishing Media: To fight fire, use dry chemical, foam, or carbon dioxide.

Unusual Fire or Explosion Hazards: Liquid petroleum contains and gives off considerable amounts of dissolved, possibly explosive gases that are a dangerous fire hazard when exposed to heat, flame, or powerful oxidizers.

Special Fire-fighting Procedures: Isolate hazard entry and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and fully encapsulating suit. If feasible, move containers from fire area. Otherwise, use a water spray to cool fire-exposed containers. Never apply water directly to a petroleum fire. Water fog or mist will act as a blanket to reduce vapors and cut off the air supply. Stay out of low areas. Vapors may travel to an ignition source and flash back. Be aware of runoff from fire control methods. Do not release to sewers or waterways where it could cause a fire/explosion hazard or pollution.

Section 5. Reactivity Data

Stability/Polymerization: Petroleum is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Petroleum (crude light) may act as a synergist (a substance that induces a greater effect when added to another substance) to pesticides. Incompatible with oxidizing agents.

Conditions to Avoid: Avoid exposure to heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of petroleum can emit acrid smoke and fumes.

Section 6. Health Hazard Data

Carcinogenicity: The IARC does not classify petroleum (crude) as a human carcinogen (Group 3) since human and animal evidence are inadequate.

Summary of Risks: Petroleum is toxic by ingestion and is a skin irritant. Aspiration pneumonitis (pulmonary toxicity due to aspiration into the lungs) is the most serious toxic effect following ingestion. Cardiovascular and neurologic toxicity are the major concerns following inhalation.

Medical Conditions Aggravated by Long-Term Exposure: Chronic skin disease.

Target Organs: Skin, eyes, respiratory system, central nervous system.

Primary Entry Routes: Inhalation, accidental ingestion, skin contact.

Acute Effects: Ingestion causes nausea, vomiting, diarrhea, and abdominal pain. Liver and renal injury may occur following ingestion. Symptoms of aspiration include coughing, choking, shortness of breath, increased respiration, and pulmonary edema. Inhalation of petroleum or its dissolved gases may result in respiratory arrest, euphoria, cardiac dysrhythmia, and central nervous system toxicity.

Chronic Effects: Prolonged and repeated contact with petroleum can cause skin disorders such as dermatitis.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, do not induce vomiting since this increases the aspiration risk. Keep victim's head between knees. Consult a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Unless a large amount of petroleum is ingested, gastric emptying is not suggested. Consider administering activated charcoal, if administer it with caution because it may also cause vomiting and increase the risk of aspiration.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. For small spills, take up with sand or other noncombustible absorbent material and place into appropriate containers for disposal. For large spills, dike far ahead of spill. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

HAZARD DESIGNATIONS

OSHA Hazardous Waste (40 CFR 261.33): Not listed

ERCLA Hazardous Substance (40 CFR 302.4): Not listed

OSHA Extremely Hazardous Substance (40 CFR 355): Not listed

OSHA Toxic Chemical (40 CFR 372.65)

OSHA DESIGNATIONS

OSHA Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an ABA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Gloves: Wear impervious gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed drums or tanks in a cool, dry, well-ventilated area away from heat and ignition sources (naked flames, sparks, welding equipment). Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. In addition, conductive tires can further protect vehicles.

Engineering Controls: Use only with adequate ventilation. Workers should be educated about petroleum's hazards and potential dangers.

Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. To prevent dermatitis use appropriate protective gear and practice good personal hygiene procedures. Monitor storage facilities for gas buildup.

Other Precautions: Provide annual examinations with emphasis on the skin and respiratory system.

TRANSPORTATION DATA (49 CFR 172.102)

Shipping Name: Petroleum crude oil

Hazard Class: 3.1, 3.2, 3.3

No.: UN1267

Label: Flammable liquid

PG Packaging Group: II

APPENDIX E

HEALTH AND SAFETY PLAN SUPPLEMENTS

Appendix F
Acknowledgement
Form

APPENDIX F

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT FORM

[illegible]

Print Name & Company

Date _____

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Print Name & Company

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